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FEB 14 1933

The ELECTRICAL REVIEW

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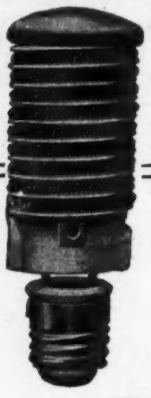

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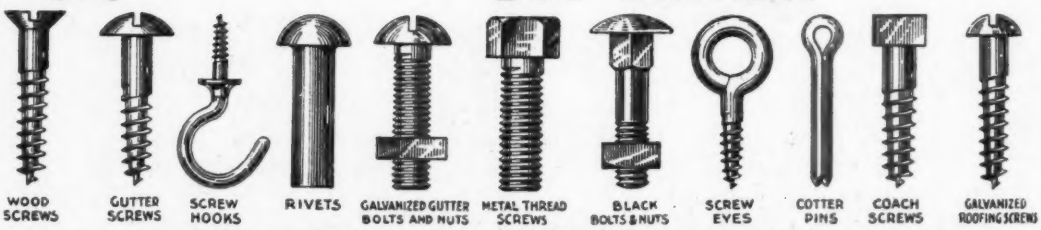

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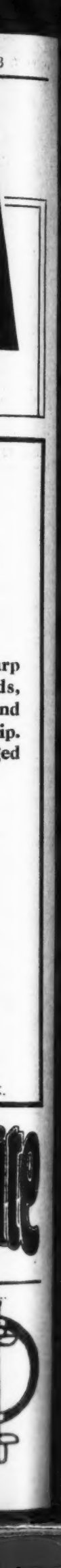

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberystwyth.—Municipal pavilion (£19,792); W. Higley, builder, Shrewsbury.

Accrington.—Alterations to 93, Blackburn Road; Prices (Tailors), Ltd.

Alnwick.—Modernising of the Poor Law Institution; W. W. Tasker, county architect, 17, Claremount Road, Newcastle-on-Tyne.

Alton (HANTS).—Houses (50), Park Close and Landsdowne Road; Council's surveyor.

Amblecote.—Houses (24); U.D.C. surveyor. Nurses' home, Ciorbett Hospital; secretary.

Ashton-under-Lyne.—Extensions to St. Anne's schools, Burlington Street, for Catholic Authorities (electrical installations); T. Warrington, builder, 51, Bennett Street, Hyde.

Banbury.—Additions to the main premises of the Co-operative Industrial Society, Ltd., Broad Street.

Bebington and Bromborough.—Houses (351); U.D.C. surveyor.

Birkenhead.—Flats (68), Canden Street; Mr. Rowse. Centralisation of institution kitchens; borough engineer. Extensions to St. Hugh's and Our Lady's Schools; Catholic trustees.

Birmingham.—Houses (74), Boldmere Road, Erdington; Morris Jacombs & Sons, Ltd., builders, 71, Hobmoor Road, Small Heath. Houses (22), Welford Road, Sutton; F. Biddle & Homer, builders, 20, Waterloo Street.

Bishop Auckland (DURHAM).—Houses (32), South Church Lane; J. Ford, surveyor, U.D.C. Offices.

Blackpool.—Private hotel and boarding house on the Promenade (electric lighting installation); Hawthorne & W. H. Bloor, builders, "Myrtles," Balmoral Avenue, Cleveleys.

Blyth (NORTHUMBERLAND).—Houses (200), South Farm Estate; L. Leeper, borough surveyor. Estate development, Wensleydale Terrace; Lord Ridley.

Bootle.—Alterations to Central Library; borough engineer.

Bournemouth.—Offices and works, Richmond Hill; Southern Newspapers, Ltd. Offices and stores, Wickham Road; Provident Direct Supply Stores. Shops and flats, Exeter Road; F. F. Tarrant. Ten shops, Holdenhurst Road; A. S. H. Whitelock.

Brean (SOMERSET).—Methodist Church; W. J. Pople & Sons, builders, Burnham-on-Sea.

Bridge of Allan (STIRLINGSHIRE).—Reconstruction of Royal Hotel, for R. Gillies; D. Beat, builder.

Bridlington.—Houses (50), South Back Lane Estate, and construction of bathing pool, entertainment hall, and open-air bandstand; surveyor, Town Hall.

Buxton (LANCS).—Conversion of the Crescent Hotel into cinema; R. T. Longden & W. J. Venables, architects, 20, Stafford Street, Hanley.

Cannock (STAFFS).—Bank, Stafford Road, for the National Provincial Bank, Ltd. (electric lighting and heating installations); C. Bryant & Sons, builders, Whitmore Road, Small Heath, Birmingham.

Canterbury.—Estate development, Nackington Road, for W. S. Cozens. Development of estate, Dover Road, for Truscott & Co., and St. Peter's Grove, for W. C. Oxbrow; H. C. Ashenden, architect.

Chelmsford.—Reconstruction of premises in King's Road; Christy Bros. & Co., Ltd.

Cheltenham.—Alterations and additions to Carr's Hotel, Clarence Street; Mrs. S. G. Cleveley.

Chesterfield.—Houses; borough engineer. Electricity showrooms, Holywell Street; Wilcockson & Cutts, architects, Saltergate. Alterations 2, 4 and 6, High Street; Marks & Spencer.

Chipping Norton.—Houses (22); R.D.C. surveyor.

Cradley Heath.—Development of estate, Dudley Wood, for houses; T. L. Tibbetts.

Darlington.—Premises for M. Jackson (Clothiers), Ltd.; P. L. Browne & Sons, architects, Pearl Buildings, Newcastle-on-Tyne.

Dumfries.—Extension of High School (£14,270); Master of Works, County Education Committee.

Duns (BERWICKSHIRE).—Houses (20); J. Coupland, burgh surveyor.

Ealing.—Houses (353), Sudbury Hill Estate; R. Costain and Sons, Ltd., 788, Norfolk Street, Strand, W.C.2. Factory, Bideford Avenue, for Alderman Silk Co., Ltd.; P. Bilton, Ltd., 113, Park Street, London, W.1. Flats (156), Greenford Hall Estate; Greenford Hall Estates, Ltd., Coston's Lane, Greenford. Houses (160) and shops, Perivale Estate, for The Wonder Homes, Ltd.; J. M. Wilson, architect, St. Quivox, Hayes. Houses (43), Russell Road and Clanson Avenue; W. Gradwell & Co., Ltd., Farnham Road, Slough, Bucks. Houses (24), shops, Priory Gardens, Rydal Crescent, and North Circular Road; R. Lancaster & Sons, Ltd., 30, Ealing Road, Wembley. Research laboratory, Wadsworth Road, for the Associated Lead Industries, Ltd., shops and flats, Western Avenue and Hanger Lane; T. P. Bennett & Sons, architects, 41, Bedford Row, W.C.1.

Eccles (LANCS).—Houses (20); borough surveyor.

Edinburgh.—Houses (34) at the Abercorn Crescent; J. Miller, builder.

Elgin.—Extensions to Infectious Diseases Hospital for the Moray and Nairn Public Health Committee; county clerk.

Enfield.—R.C. school; Sandy & Norris, 20, Bedford Row, London, W.C.

Essex.—School, Leigh Beck, for the County E.C.; J. Stuart, county architect, Chelmsford.

Exeter.—Church; Rev. F. C. Eddy, 13, Mont-le-Grand. Flats, King Street; Exeter Workmen's Dwellings Co., Ltd.

Farnham (SURREY).—Houses (50), Gordon Road; Captain Riches, builder.

Friern Barnet.—Houses (31), Bawtry Road; Bateman Building Co.

Gateshead-on-Tyne.—Branch premises at Lobley Hill, for Co-operative Wholesale Society; C.W.S. Architects' Dept., 80, Westmorland Road, Newcastle.

Gillingham (KENT).—Houses (136); J. L. Redfern, borough engineer.

Greenock.—Extension to spinning mill (£5,000) for Fleming, Reid & Co.; the manager.

Hampshire.—School (282 places), Purbrook, for the County E.C.; A. L. Roberts, county architect, Winchester.

Hebburn-on-Tyne.—Hotel at the corner of Black Road and Victoria Road East for W. G. Coulson; J. H. Morton and Son, Fowler Street, South Shields.

Hertfordshire.—Infirmary block, Nurses' Home, &c., Ware, with heating and electrical work (£33,965), for the P.A.C.; C. E. Elcock, architect, Windmillhill, London, N.W.3.

Isle of Man.—School, Pulrose, for the County E.C.; director of education, Douglas.

King's Lynn.—Canning factory, West Lynn, for Lincolnshire Canners, Ltd.; R. W. Dye, builder, South Gates.

Kingston (SURREY).—New premises for showrooms and stores, Cromwell Road; S. P. Anderson, architect, Creek House, High Street.

Leatherhead.—Municipal offices, Kingston housing site; U.D.C. surveyor.

London.—(FULHAM).—Extension of the Town Hall (£19,776); W. Cave, architect, 132a, Cromwell Road, S.W.7. (HITHER GREEN).—Shops, St. Mildred's Road and Hither Green Lane; A. Frampton. (LEWISHAM).—Development of Northbrook Park Estate; Wates (Streatham), Ltd. (STOKE NEWINGTON).—Flats (100), Amhurst Park; H. S. Fleming. Flats (56), Lordship Terrace (£32,000); borough engineer. (TOTTENHAM).—Factory extension, Fawley Road; Albion Sewing Cotton Co., Ltd. Swimming bath, Lordship Park; U.D.C. surveyor. School extensions, Risley Avenue and Devonshire Hill (£8,222), for the E.C.

Maidstone.—Extensions, Barming cannery, for Baird, Wolton & May, Ltd.

Manchester.—Houses (204), Clayton; housing director, Town Hall. Additions to factory premises, C. Whatmough, Ltd., 16, Vesta Street, Ancoats. Extension to Mossley Post Office; H.M. Office of Works, King Charles Street, London, S.W.1.

Marlow (BUCKS).—Houses (36), Oak Tree Road, for Jamieson Bros.

Motherwell.—Power house, &c., sewage purification works; burgh engineer.

Nelson.—Houses (20), Block Hall Estate; borough surveyor.

Newcastle-on-Tyne.—Extensions to business premises, A. Bedson, Regent Chambers, New Bridge Street; T. K. White, architect, Groat Market and Ridley Place.

Northampton.—Houses, Beatrice Road, Kettering; Phillips & Slow, builders, Hallwood Road, Kettering.

Oban.—Cinema for the Oban Cinema, Ltd.; the secretary. Pavilion and tea-rooms (£5,000) for the Corporation; burgh surveyor.

Oxfordshire.—Practical subjects' centre, Henley-on-Thames, for the County E.C.; T. O. Willson, director of education, New Road, Oxford.

Paisley.—Cinema, Glasgow Road; R. Clark, 101, Finchley Road, London, N.W.

Pontefract.—Showroom extensions, Back Northgate; Barber & Hasletine.

Portland.—Council offices (£7,193); Smith & Lander, Ltd.

Preston (LANCS).—Alterations to the branch at 81, Church Street of the Midland Bank Ltd.; Whinney, Son & Austen Hall, architects, 37, Norfolk Street, London, W.C.2.

St. Helens (LANCS).—Houses (36); borough surveyor. Dog racing tracks, St. Helens Greyhound Association and St. Helens Greyhound Racecourse Co.

Sanderstead.—Development of Sanderstead Hill; Morgan, Baines & Clark.

Shoreham (SUSSEX).—Houses (44); A. Saunders, builder, Upper Rock Gardens, Brighton.

South Shields.—Business premises, The Nook; T. A. Page & Sons, architects, 67, King Street.

Spalding.—Business stores, New Road (£10,000) for Greenall & Son.

Stafford.—Reconstruction, The Guildhall (£18,000); borough surveyor.

Staincliffe (YORKS).—Reinstatement after fire to mills; Crabtree & Co., Ltd., Spring Mills.

Stewarton (AYRSHIRE).—Houses (50); burgh surveyor.

Stockton-on-Tees.—Rebuilding of Hippodrome Theatre; Chadwick & Watson, architects, 9, Albion Street, Leeds.

Stoke-on-Trent.—Alterations to branch premises, Newcastle Street, for the Burslem and District Co-operative Society, Ltd., Wedgwood Place, Burslem.

Stourport.—Houses (80); M. Wilesmith & Son, builders, Malvern.

Sunderland.—Cabinet making factory for H. Binns, Son & Co., Ltd., Fawcett Street; Stafford & Sons, 5, Rudland Terrace.

Surrey.—Elementary school, Kenley, for the County E.C. Extensions to Ottershaw Isolation Hospital for the C.C.; clerk, Kingston-on-Thames.

Thornaby-on-Tees. — Residence, electrically equipped, Thornaby Green, for F. Smith.

Twickenham.—Alterations and additions to Nos. 20-22, King Street; F. W. Woolworth & Co., Ltd.

Upton (YORKS).—Police station; West Riding Architect, County Hall, Wakefield.

Wallsend.—Houses (218); borough engineer.

West Hartlepool.—Factory for the North of England Match Co.; Harland & Parker, builders.

Wheatley Hill (DURHAM).—Extensions and alterations to premises of Sherburn Co-operative Wholesale Society; C.W.S. Building Dept., West Blandford Street, Newcastle-on-Tyne.

Wigton (CUMBERLAND).—Conversion of premises into a factory for the British New Wrap Co.; Sir F. Mills, Chairman of the Company.

The
Electrical Review

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Distribution Must be Speeded Up!

FUTURE policy regarding generation having been settled, the most profitable field for investigation is the distribution and sale of the product of the power stations. We have frequently drawn attention to the increasing relative importance of the distribution side of undertakings, and have shown how this is reflected in the growing proportion of the total capital expenditure that is devoted to getting the output to the consumer.

In spite of this marked tendency, improvements in distribution capital efficiency, as measured by kWh sold per £ invested, are not in any way comparable with those for generation. Mr. J. M. Kennedy and Miss D. M. Noakes brought this out clearly in their I.E.E. paper (see page 156), but, while we fully agree that a great deal more might have been done, and ought to be done, to develop distribution and sales in many cases, we think that the analogy between generation and distribution should not be carried too far.

Nothing but good can come of increasing the output per unit value of generating capacity, but this does not always apply to distribution. Contributory towards the static conditions of the latter, measured in this way, are causes due to the opposite of sluggishness; these include the opening up of "lean" areas where the consumption is less than was at one time considered the minimum for profitable operation. The undertakings which carry out this enterprising policy are performing a far greater public service than those which are content to take the cream of the load in congested areas.

The "Kennedy" curve, which was originally included in the first Weir Report, undoubtedly does show broadly that low tariffs result in greater output. It might also be argued that in some cases it proves the converse; that is to say, low average prices may come from increased output due to energetic salesmanship, and may be the effect of higher load factors with two-part tariffs.

We mention this in order to emphasise that "low tariffs are no substitute for salesmanship" (an aphorism due to Mr. Pinkney, we believe). Energetic consumers' work generally does accompany low rates, but it does not invariably do so.

The two-part tariff put forward in the paper incorporates a secondary charge of three blocks, which has the merit of encouraging water heating and space heating at the lowest rate. The authors suggest 0.5d. as a maximum for the third block, and it must be regarded as a maximum only under the grid tariff, provided that care is taken to make a primary charge that has proper regard to peak responsibility.

Success will depend upon how the merits of electricity are brought before the consumer, with the aid of assisted wiring and simple hire of apparatus, particularly in the areas of the smaller undertakings. If such undertakings are unable to bring their methods up to the level of a few brilliant exceptions, then probably we shall be forced to adopt some such solution as the authors propose in the formation of distribution boards.

An Urgent Matter

THE theme of the I.E.E. paper is taken up by Brig.-Gen. R. F. Legge in an article contributed to this issue. His idea is that some of the smaller undertakings which are now becoming distributors only have too restricted a scope, and perhaps too limited a view, at a time when rapid expansion is essential. He is a power company man, and probably will not be considered an independent observer, but there is certainly food for thought in his suggestion that the large bulk suppliers could become bulk distributors with advantage to the whole industry. Unfortunately, any attempt to apply this throughout the country might result in putting the brake on the activities of quite a number of the smaller undertakings who have recognised their duty to the public in a splendid fashion, and in some ways are far ahead of the larger concerns. On the whole, it would appear that the matter could

best be dealt with by the Central Electricity Board, which, after all, has to dispose of the large fund of energy which its activities have created. One thing is certain: neither the Board nor the industry can afford to wait until people come along and beg for a supply at any cost.

Antiseptic Coal Smoke

SMOLLETT, contrasting rural conditions with life in London, discloses that in the mid-eighteenth century people had the same notion about the antiseptic property of coal smoke as they have now about tobacco smoke. "Now," says Matt Bramble in *Humphry Clinker*, "mark the contrast at London. I am pent up in frowsy lodgings, where there is not room enough to swing a cat, and I breathe the streams of endless putrefaction; and these would undoubtedly produce a pestilence, if they were not qualified by the gross acid of sea-coal, which is itself a pernicious nuisance to lungs of any delicacy of texture. But even this boasted corrector cannot prevent those languid sallow looks that distinguish the inhabitants of London from those ruddy swains that lead a country life." Smollett might have been a valuable witness in the electricity supply interests during the late pother in London over the chimney effluent of giant power stations. Now that smokelessness—at least from such sources—is enforced rigorously we may expect pestilence to gain the upper hand once more! Perhaps we shall see health authorities demanding the destruction of smoke eliminators as a sanitative measure.

Less Red Tape

MR. W. N. C. CLINCH, of Brighton, has set a good example to supply authorities in introducing a scheme for the hiring out of cookers and other appliances. Before going into details he says that the basis of the scheme should be "the minimum formality to the consumer in completing a hire agreement, the least expense and inconvenience to the consumer arising out of the installation of such hired apparatus, and the provision by the undertaking of additional service staff." These are three obvious essentials to the success of electrical service which have been sadly neglected for many years, especially by municipal undertakings, who have been lovers of forms and ceremonies. Can we hope that Mr. Clinch's example will be widely followed?

Free Electricity

THE happy consumers in Hammelwarden, Germany, are to receive a free supply of electricity for two months. The reason given is the prosperous state of the supply company. Its prosperity is likely to be increased as a result of its generosity, as the public will presumably make the most of the opportunity, and will thus achieve a higher standard of consumption than ever before. Once having known the delights of an abundant supply, many will not be able to bring themselves to revert to the old standards, and we should expect the consumption per head to be appreciably increased in the future. An experiment on these lines by one of the more enterprising of our own undertakings would prove interesting.

Parochial Criticism

INFORMED and constructive criticism of the work of public electricity supply authorities is very desirable, but it should relate to the manner in which such authorities are fulfilling the purposes for which they were appointed. A weekly contemporary attacks the London and Home Counties Joint Electricity Authority as "a bureaucracy that aims at a State-backed monopoly," and warns ratepayers and consumers to watch its operations. Consumers do, no doubt, watch the price reductions, tariff standardisation, and hiring schemes put into force by the Authority, and that is all that they will trouble about. But the Authority is also persuading members of local councils "to part with purchase rights" over small Provisional Order companies, so that in due season they may be transferred to one controlling body instead of being broken up in bits and pieces among the local councils. To the parochially minded this may be a disaster; to those who want to see electrical development go ahead this activity alone would justify the existence of the J.E.A.

Visit the Fair

ON another page we reproduce the programme of electrical functions which have been arranged in connection with the Birmingham Section of the British Industries Fair (February 20th-March 3rd). We need not remind readers of the ELECTRICAL REVIEW that we regard this display as one of considerable importance to the electrical industry. In the absence of a purely electrical exhibition this is the one opportunity of the year for our manufacturers to show what they can do, and we urge all members of the associations concerned, as well as "independent" electrical men, to pay Castle Bromwich a visit if they possibly can.

The E.A.W.'s New Home

THE Electrical Association for Women has now achieved headquarters in the centre of London, a fitting mark of its services to the industry in popularising the use of electricity in the home, in the training of demonstrators, and in representing the point of view of the domestic consumer. This service the industry has recognised in the most practical way. Leading firms have given the financial guarantees requisite for the lease of the new premises, and the manufacturers of apparatus and cable have presented or lent the latest electrical equipment. This is the kind of spirit in which, more than anything else, the hope for electrical progress lies.

Electricity in the Bathroom

WE have on occasion had to draw attention to evidence that the use, or rather abuse, of electrical apparatus in the bathroom causes trouble that is not experienced in other parts of a house. Three fatal accidents during the past few days have proved further indication that the present safeguards are not good enough. Such accidents are, of course, rare compared with the number of cases in which electricity is used with perfect safety in the bathroom. They were caused by actions which to an electrical man might appear foolish, but consumers should be protected as far as possible from the consequences of their folly. These cases receive disproportionate publicity in the lay Press and do no good to the industry. We commend the subject to the attention of the newly formed Home Safety Committee.

Remote Indication

MUCH time can be wasted in attempts to co-ordinate the readings of instruments that register at separate points of a supply system or power station. The readings are often of real value only in their temporary relation to one another, and should be observed simultaneously if the control engineer is to carry out his duties properly. A convenient classification of remote indicators into seven types is made by Messrs. C. Midworth and C. F. Tagg in a paper read before the Meter and Instrument Section of the I.E.E. Each type has its own particular sphere; the systems are: potential, ohmmeter and ratiometer, bridge, induction, impulse, step-by-step, and current. We have not yet exploited to the full this great advantage of electricity, which is a reminder that progress is not to be measured only by the output of our generating stations. It depends upon our embracing every opportunity to use electrical methods, many of which have no immediate effect on output.

Shell-Mex House

1. The restaurant. 2. Main and kitchen ventilation plant. 3. The building from the Thames. 4. A corridor at the Strand entrance. 5. The main switchroom. 6. Vestibule lighting at the main entrance. 7. Cold-water supply pumps and control equipment. 8. A line of circulating pumps for the hot-water system

D

Shell-Mex House

Electricity in a great London building

THE recently completed new headquarters of Shell-Mex, Ltd., stands on the site of the old Hotel Cecil and is probably the largest commercial building in London. Electricity plays an important part in the major services. The present maximum load is about 750 kW, and this figure will probably be doubled when the building is fully occupied.

Supply is received from the Charing Cross Electricity Supply Co., Ltd., at 11 kV, 3-phase, and is transformed to 400 V on site. There are two 500-kVA Bruce Peebles transformers (with provision for a third) each with a 200-A h.p. Reyrolle switch attached. The transformers are arranged on a ring main and the switches incorporate interconnection links apart from the transformer switch-fuses. On entering the main switch room one gets the impression of a modern power station control room. Eleven main distribution B.T.-H. metal cubicle switch panels are separately mounted and well spaced on a horse-shoe tiled bed or cable chamber. The larger motors are supplied individually or in groups directly from these main switches, but each of four distribution units supplies a switch room in one of the four corners of the building at the bottom. Rising mains are carried straight up through the building at each corner, serving four sub-switch rooms (one phase and neutral) on each floor, so that at each level there are four separate sub-distribution systems.

Each of the four sub-switch rooms is equipped with a pillar-type three-phase distribution panel in a sheet-metal housing. All the power sub-distribution boards are also of G.E.C. manufacture. At each floor feeding point there is a 200-A "Safette" oil switch-fuse supplied by L. Weekes (Luton), Ltd., which serves Dorman & Smith distribution boards. Most of the cables were supplied by British Insulated Cables, Ltd., and the majority of the small switches by J. H. Tucker & Co., Ltd. We saw Glover's trifurcating boxes on the main distribution cables.

The Water and Air-circulation System

Oil-fired boilers serve for heating the building, mainly by a hot-water circulation system, but also in connection with the Plenum systems of ventilation and air conditioning in which the circulated air can be passed over steam-heated vanes, or vanes cooled from a compressor system.

We saw a steam-driven fuel oil pressure pump, but everything else seemed to be electrically driven. A two-cylinder Hall compressor is served by a 145-h.p. Laurence, Scott s.r. motor, and the air-circulating fan and the circulation pump for the humidifying sprays on the main Plenum system are served by 22- and 40-h.p. Bull motors, respectively. All the motors carry labels indicating one or other of these makes. A small ventilation system serves the kitchen only, and each installation has its own extraction fan mounted on the roof.

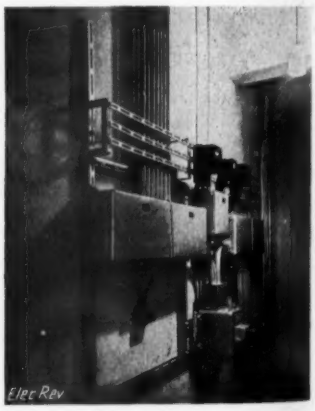
One of the corridors

Five 5-h.p. motor-driven pumps circulate hot-water continuously round the building through calorifiers, and three similar pumps serve roof tanks from tanks in the basement filled from the public mains. The latter pumps are governed by float switches, and inter-switching provides that any one or more pumps can serve any one or more tanks. Brookhirst motor switchgear is very prominent, and is mostly of the contactor type.

For starting from cold there is a fuel-oil heater, three phase, 16 kW, supplied by the Clyde Oil Fuel System, Ltd. It is thermostatically controlled, as is the building heating throughout. The temperatures of the water to and from each section of the house are recorded electrically in the boiler house and the valves are operated electrically On the control board is a Negretti & Zambra multi-point temperature recorder. The heating and ventilating system was installed by Young, Austen & Young.

The High-speed Lifts

There are sixteen passenger lifts—four 2-ton, ten 1½-ton, and two ¾-ton—all supplied by the Express Lift Co., Ltd. The fourteen larger lifts have gearless drives, *i.e.*, the sheaves are directly mounted on the motor shafts and the motor and lift speeds are 64 r.p.m. and 500 ft. per min. The operation control is of the variable-voltage type and the signal control semi-automatic. Two of the 30-cwt. lifts serve fifteen floors, a unique feature, it is believed, for commercial buildings in London. The other two lifts are served by geared motors and the lift speed is 350 ft. per min. They have variable-voltage operation control and fully automatic signal control.



Part of the switchgear and rising mains in a sub-switchroom

The Lighting Arrangements

The greater part of the interior lighting is by G.E.C. enclosed fittings, including some excellent box-type examples in the corridors and some especially attractive metalwork units in the directors' and committee rooms, &c. In the directors' dining room and the Embankment vestibule is very effective cornice lighting using 4-ft. filament tubular lamps supplied by Maples, Ltd. "Girpo" type fittings, made in this country, with glass ray-extending discs round central enclosed units afford pleasing lighting in the restaurant and vestibules illustrated on page 147.

The clock tower and the Strand entrance are floodlighted by Ediswan projectors. The electrically operated clock was fully described by Mr. T. R. Robinson in our issue of July 29th, 1932. It is said to be the largest tower clock in London, and it has self-acting winding gear.

An electrical conveyor-type dish-washing machine, supplied by Benham & Son, Ltd., was seen among the kitchen equipment, which also includes two large Hall refrigerators, served by interchangeable motor-driven compressors, and electrically driven blowers for the oil-fired cookers. Provision is made for supplementary electric heating, if required, in most of the offices, &c. A No. 15 Siemens Strowger automatic intercommunication telephone system serves the building, and is designed for an ultimate capacity of 900 lines. It has 300 lines at present.

Some Municipal Electrical Engineers

From left to right: Mr. S. Clegg, Lincoln (*Lafayette*); Mr. F. Nichols, Derby (*Lafayette*); Mr. D. H. Davies, Chesterfield (*Lafayette*); and Mr. John Mould, Leicester

No-Volt Traction Relays. By E. H. Croft, A.M.Inst.C.E., A.M.I.E.E.

When their installation is most desirable

THE design and application of the no-volt relay to electric rolling stock introduces questions of considerable complexity, due mainly to the following: (1) Voltage interruptions vary greatly in duration, or they may be only partial. (2) The supply of electricity for remote control may be entirely unconnected with the main power supply, and is thus subject to independent interruptions. (3) In multiple-unit working there are two essential parts of the control:

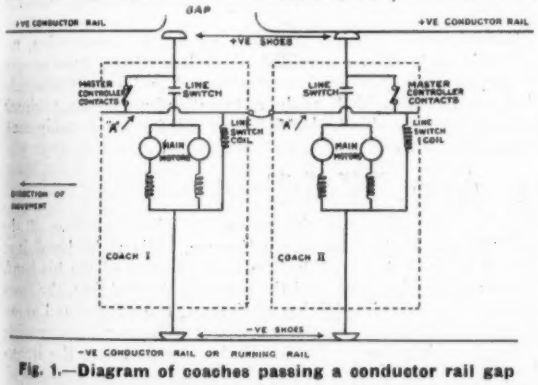


Fig. 1.—Diagram of coaches passing a conductor rail gap

first, the driver's master controller and ancillary switches; and, secondly, the true control side, consisting of contactors, reversers, &c.

The simplest form of interruption is the opening of a track-feeder breaker at a sub-station due to fault. Such interruptions may affect more than one vehicle. Automatic reclosing circuit breakers usually reclose in about fifteen seconds and a driver running at speed may omit to notice the failure. The most frequent type of interruption occurs on conductor rail systems because such rails cannot be continuous throughout complicated trackwork. The introduction of a bus throughout the length of the train reduces but does not eliminate these interruptions. Without a bus such interruptions act separately on each motor coach. Partial interruptions are also caused by short gaps, the leading shoes making contact before the arc of the trailing shoe has broken.

The Control Supply

Almost all equipments utilise remote control, the current for which is obtained directly from the line *via* a rotary transformer or for a battery. In multiple-unit stock where no bus line is provided, and the control current is supplied direct from the line, the control current cannot be taken from the same collector as the power current.

Fig. 1 represents two motor coaches forming a train passing over a gap in the positive conductor rail. For simplicity the two motors on each coach are shown controlled by a single line switch, the coil for which is fed from a control train line. The master controller at the outer ends of the two motor coaches is represented by a single switch controlling train line A. It is assumed that the driver is operating from coach I; thus the switch on coach II will be open. As the switch on coach I obtains its supply from coach I shoes, the control circuits *throughout the train* are dead. As soon as coach I shoes meet the conductor rail again, the control is energised throughout the train, but the motors of coach II will lose their current until the gap has been passed, the control currents being unaffected. Normally where the control circuits operate starting resistances, or the like, these are never called into operation as coach II passes the gap, but function unnecessarily on coach II when coach I passes the gap.

If a rotary transformer or motor generator is used without a battery, the time taken for the low voltage to collapse after the line voltage has failed may be anything between a fraction of a second and about twenty seconds. The average is more than enough to maintain supply over the majority of gaps or momentary interruptions caused by faulty collection.

The time element also may maintain control supply during the opening and closing of a sub-station automatic circuit breaker. Thus for the majority of cases there is little difference between the rotary transformer and the battery.

Fig. 2 represents in schematic form the control system of a normal multiple-unit train made up of motor trailer and driving-trailer coaches. If no bus line is provided an interruption to any motor coach may not affect the control, and the relay (if installed) should be fitted on the main control apparatus of the coach, and not on the master controller for the whole train. If a bus line is provided the relay can generally be arranged on the contactor groups, no relay being required on driving trailer cars.

Types of Relay

If the relay is energised by a shunt winding with series resistance directly across the line the increase in resistance due to temperature rise is almost negligible. The voltage of traction systems may vary from 67 to 113 per cent. of the normal.

The relay must lift at the lower figure and will drop out at 50 per cent. of the normal. Equipments are operating with

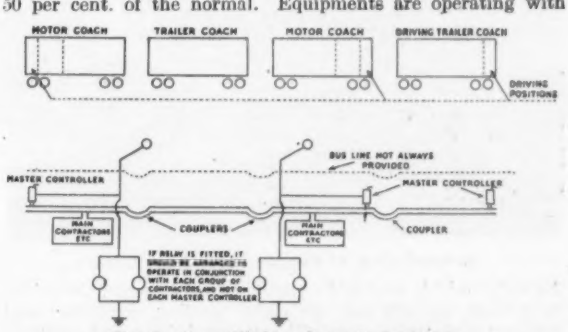


Fig. 2.—A multiple-unit control system

relays utilising a series winding energised by the motor current but these require special interlocks so that they lift on the first step of the controller; their drop-out ampere turns must be less than those of the shunt type, resulting in slower action. The series relay must lift after a short coasting period, with minimum line volts; the current is a small fraction of the normal at full volts. Thus for short conductor-rail gaps the

operation of the series relay is much slower, and the surge range that motors have to withstand is greater.

Tests carried out with shunt and series relays on a system subject to partial and very short interruptions showed the shunt type to be considerably more sensitive. On high-voltage systems, the series winding, which requires no resistances, is cheaper and simpler.

With the "all-electric" or "Sprague" system of control, the contactor will often remain closed during the dropping and relifting of the no-volt relay when passing over a short gap. The best solution is probably the use of a quick acting and an auxiliary damped relay operating in conjunction with one another.

Direct and Remote Systems

Direct drum controllers are used extensively on light urban and suburban services, and also for shunting locomotives for industrial work. A limited number of such services operate on conductor rail systems, where interruptions are frequent. With overhead collection, trolleys may come off at turn outs, and the driver is not compelled to return his controller to the "off" position before replacing the trolley. Thus a no-volt relay is very desirable, but is rarely installed due to the complication of fitting them to direct drum controllers.

Remote control with overhead line, multiple unit, non-automatic acceleration, line volts control, was used for the earlier urban and suburban trains, and may be applied to an economical light class of modern equipment. Where there is no power bus line, a failure of supply to any motor coach, other than the driving coach, will not be definitely indicated to the driver unless a no-volt relay is provided.

Heavy main-line locomotives, designed for multiple unit control, are generally arranged with no-volt relays, which give visible indication in the driver's cab. If a sub-station auto-close circuit breaker opens, all power and control circuits will be de-energised together, but the return of the controller to the "off" position rests with the driver unless a no-volt relay is provided. With non-automatic control the use of a battery has little effect on the desirability of providing no-volt relays, because the control supply may be external to the one coach to which the supply is interrupted. For interruptions to the complete train there is again little difference, as the return of line voltage is at once applied to the motors unless the driver has switched his master controller to the "off" position, or a no-volt relay has prevented the line switches picking up except in the first position of the master controller.

Non-automatic remote control with conductor rail, multiple unit stock is similar to the foregoing as regards total interruptions of supply, but local interruptions to individual coaches occur regularly when coaches pass over gaps. A train line bus reduces interruptions and eliminates interruptions to individual coaches. Whole train interruptions will take place due to the larger gaps. For this reason a no-volt relay is desirable, but not essential, and equipments are running without such relays. The provision of a train line bus prevents the control supply failing or existing except in unison with the power, unless a battery and/or motor generator is provided. If a relay be provided on each motor coach of a train on the control side (not the master side) the equipment can easily be arranged to notch up automatically after any form of interruption. In the case of conductor rail systems, without a bus line, the no-volt relay will save the motors from many surges and possible flashovers apart from danger of damaged gears. With a bus line, local interruptions on individual coaches being largely eliminated, the desirability of the relay is less, particularly as with line volts supply for the control, automatic acceleration provides limited no-volt protection, since the control circuits and power circuits will be de-energised and re-energised in unison.

If a battery or motor generator be provided this action does not take place, and a relay is an advantage.

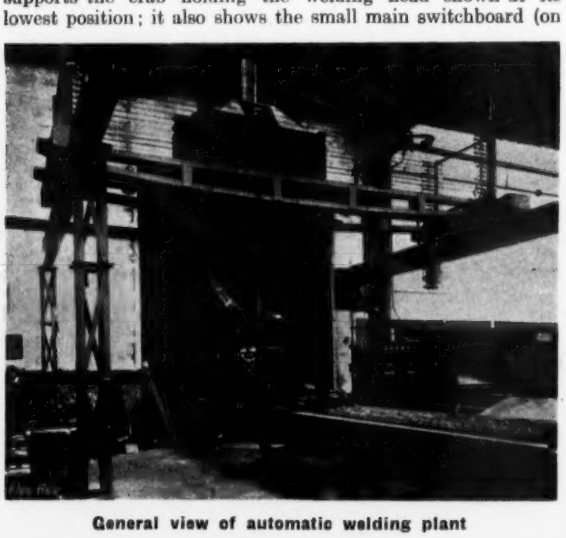
Conclusions

No-volt relays almost always have advantages, but are not essential in all cases; with automatic control a no-volt relay is simple and effective. For light non-automatic systems, no-volt relays need not be provided, unless such equipments are run on conductor rail systems without train line bus, but for heavy locomotives, which are almost always non-automatic and generally multiple-unit, no-volt relays should be provided to give visible indication of operation in the cab. The need for a no-volt relay is not so great on locomotives having line-voltage control systems and bus lines, but it is desirable.

For all multiple-unit stock with automatic acceleration, no-volt relays should be provided regardless of the type of conductor system or provision of power bus line. If the sub-stations are provided with automatically reclosing circuit breakers, relays should be fitted to all forms of equipment.

Automatic Carbon Arc Welding

THE automatic carbon arc equipment illustrated in the accompanying pictures is in operation at one of the largest boiler works in this country. The general view of the plant indicates the gantry carrying the bridge, which supports the crab holding the welding head shown at its lowest position; it also shows the small main switchboard (on the right) which carries the recording instruments, the relays controlling the arc, and the main welding contactor and auxiliary motor contactors. The gantry, bridge, and constructional details of the head and crab are entirely of welded design. Two welding motions are possible, for the crab moves across the bridge, which travels up and down the gantry.



General view of automatic welding plant

The stock to be welded is not clamped but merely tacked by hand and rested on or against the heavy "H" sections which act as a table. In the illustration on page 151 of the welding of a girder to an angle iron, the operator has his left hand on the wheel of the cross-head of the welding head, and is watching the weld through the protective glass window of the asbestos shield that surrounds the arc. His right hand is at liberty to work the push-button controls seen above his hand. These enable him to control the speed of the welding, the direction of traverse, the striking of the arc, the raising and lowering of the head, &c. All the operations are under his immediate control so that the arc can easily be steered along the irregularities of seams.

The actual carbon head is hidden by the asbestos shield and the casing, but from the photograph showing the welding of an air trunk by butting the plates at right angles without veeing it will be seen that two large reels are fitted. One reel carries filler wire of 2 mm. diameter, which is fused in the arc but carries no current; the other carries twisted paper fed to rub on the white hot carbon, which in combustion generates a gas, surrounding and protecting the weld from contamination due to oxidisation from the atmosphere. The feed of the filler wire can be adjusted to suit the requirements of the weld; in some cases welds are made without added filler wire by the fusion of the two metals forming the joint.

The separately excited welding generator is direct-coupled to the driving motor. Other motor drives include a fan for exhausting the gases from the arc, a cooling water pump (mechanically interlocked to prevent operation if the water is not circulating), the operation of the filler wire and twisted paper, the feeding of the carbon, electrically operated hoisting and lowering gear of the head with magnetic brake, and the traversing arrangement of the crab and the bridge with gears and clutches having quick returns, all of which are under the operator's control from the push-button board on the welding head.

Welding speeds up to 120 ft. per hour (suitable for seal welds) are available, the most suitable average speed being 70 ft. per hour where appearance and strength are of importance. As an example, ⅜-in. plates, butt-welded with a current of 320 A, were penetrated and broke at 25.6 tons per sq. in. of plate material. No filler wire was used and therefore the weld was slightly concave due to contraction, but its strength, being over 25 tons per sq. inch, was equal to that of the plate. The machine illustrated will butt weld plates down to 3/16 in., and is supplied by the A.E.G. Electric Co., Ltd.

Training Electrical Engineers. By J. V. Brittain, B.Sc.

The significance of the National Certificates

DURING the last ten or twelve years technical education has undergone definite changes. I refer in particular to the technical education of those, usually referred to as *trade apprentices*, who form the bulk of the students in the technical schools and colleges throughout the whole of the country.

These students receive their technical training by attending on three evenings a week during the winter with the addition, in some cases, of one or two half-days, for which they are paid by their employers. It is to be regretted that employers and others who should be interested in the subject are not aware of the nature or value of this training. It is only those who are actively connected with this work who realise what has been and is being done in this direction. The standard reached, the variety of subjects offered, and the facilities for experimental or practical work are all receiving continual attention and very definite changes have been made since the end of the war.

Mr. J. V. Brittain is head of the Electrical Engineering Department of the Municipal Technical School, St. Helens, Lancs

In 1920 the National Certificate scheme was inaugurated and the three or four years following saw its adoption by most State-aided institutions. Previous to this there was no uniform scheme and each institution had its own system and trained its students for examinations set by the Board of Education or the City and Guilds organisation. For engineering students the City and Guilds was the generally accepted standard and these examinations both in theoretical and practical work were excellent. They did not, however, necessitate any very definite scheme of preparation and in particular did not make imperative the laboratory or experimental work which is an absolutely essential part of technical training. With these points in view the present scheme was formulated and put into operation jointly by the Board of Education and the Institution of Electrical Engineers.

The essential features of the scheme are as follows:—(1) The buildings and equipment of the institution must be such that students can be satisfactorily trained to the standard required. (2) The scheme of work and syllabuses must be submitted and approved. (3) The examination papers must also be submitted and approved. In addition the worked papers in the years for which certificates are granted are checked by assessors appointed by the joint board. (4) Before entering an examination and passing to the next stage each student must have obtained a certain percentage of homework marks and must have completed a satisfactory amount of laboratory work.

The Nature of the Courses

By this means it is ensured, as far as possible, that when a student sits for his examination he has been correctly taught and in addition has done sufficient work to prepare him for the particular examination. Provided they are suitable and reach the required standard, the actual studies and the examination can be varied to suit the needs of each group of students or to suit the type of work carried on in the district concerned. The actual class-work is, of course, examined periodically by the inspectors appointed by the Board of Education. These inspectors are specialists in one branch or another of technology.

A student normally enters the National Certificate course at the age of sixteen and first completes a three-year course for the *ordinary* or *senior* National Certificate. The standard of this examination can be described as that required by a skilled wireman or maintenance electrician. The years for this course are designated S.1, S.2, and S.3, and are called *senior* courses.

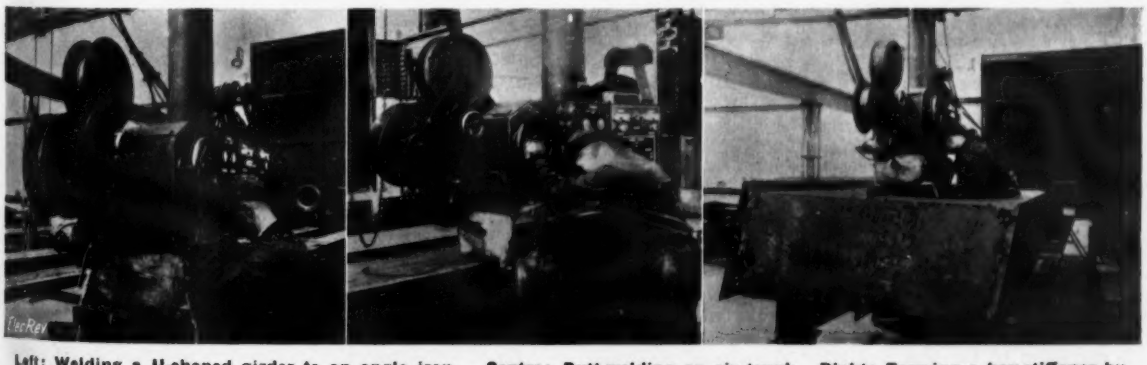
Following on this there are two *advanced* years (A.1 and A.2) leading up to the Higher National Certificate. In this case the standard is such that the certificate is accepted as exempting from the technical part of the A.M.I.E.E. examination. A student who holds the Higher National Certificate can become a graduate by taking an examination in English only. As a rule the first advanced year (or the fourth year of the whole course) is devoted to a study of electrical machinery while in the final year the student specialises in such subjects as transmission and distribution, or the design of electrical machines.

Hard Work and Sound Preliminary Training

To cover the whole course in five years requires continuous hard work on the part of the student and it will be readily understood that a good deal depends on his previous training. On account of his acquaintance with physics and mathematics a boy leaving a secondary school at the age of sixteen will find the first two or three years easier than most other students. One who has been at a junior technical school will also have a definite advantage: in any case it is assumed that if he has not been to a secondary (or central) school or to a junior technical school he will have attended evening continuation classes. In many institutions there is a "pre-senior" or preparatory course which is available for those who are not quite up to the standard necessary to take advantage of the first year proper. This preparatory course is becoming more essential as the standard of work in the early years is being gradually raised and as a result a higher standard of entry is required.

It is evident, therefore, that the youth of to-day, if he lives in or near a town, has every opportunity of obtaining a technical training at a nominal cost. Wherever he obtains his certificate it is a "National" one awarded jointly by the Board of Education and the I.E.E. It should be noted that the City and Guilds have withdrawn most of their examinations (in England and Wales) in favour of the National Certificate system (that is in the cases where they would be redundant).

The advantage of the student's attendance at one or more day classes cannot be too highly stressed and it is very satisfactory that more employers are allowing their apprentices time to attend such courses. There is, however, not as much co-operation between the employer and the technical institutions as is desirable. Many schools provide employers with records of attendance and progress and this should be extended as far as practicable. Employers should get to know what is being done in the local school; and at the same time schools should see that their courses are made known, not only to prospective students but also to their employers for the scheme is to the advantage of both parties.



Left: Welding a U-shaped girder to an angle iron. Centre: Butt-welding an air trunk. Right: Forming a box-stiffener by welding two angle irons **(See opposite page)**

"Wax-operated" Switches. By A. G. Bullen

Circuit-breaking by novel means

THE original object of this investigation was to provide a simple piece of apparatus to protect fractional-h.p. motors, instrument circuits, and the like, which could not be protected by the smallest practicable fuse of a replaceable type. Copper reaches its melting point at 2,000 deg. F. For a fusing current of 3 A the cross-sectional area of wire is 0.000018 sq. in., equivalent to No. 40 s.w.g. copper. This sectional area of metal must be broken by the heating effect of a current, either making a direct rupture of the circuit or else enabling a force to be applied that will be sufficient to open the circuit.

The hardness or softness of wax depends upon the amount of contained heat. If therefore the circuit to be disrupted were associated with a wax substance affected by the heating of a current carried by the conductor, the removal of the mechanical support of the conductor would cause it to be distorted, the movement permitting some further mechanical stress to be applied. One solution was to form the wax into a strip or small-diameter rod and then to deposit copper (or other metal) on it until the sectional area of the deposited metal became equal to 0.000018 sq. in. The deposited metal would electrically be approximately equal to the 40 s.w.g. wire, but mechanically it would be dependent upon the wax. Since 3 A would be sufficient to fuse the metal coating at 2,000 deg. F., a much smaller current would cause a temperature rise sufficient to change the physical nature of the wax supporting the deposited metal; this change has been used to interrupt the circuit.

Tubular Fuses

Two main factors are involved: (1) The conducting medium, in which the passage of current generates an amount of heat; (2) a wax substance associated with the conductor in such a manner as to be directly affected by the heat generated. The term "wax substance" broadly covers all insulating materials which, when the amount of heat content is varied, become harder or softer, or more or less "tacky." The wax substance acts as a mechanical support for its associated conductor, or a brake upon any movement of the conductor which is normally secured firmly. Electroplated wax rod or strip may be considered as equivalent to a fuse to this extent: the heating effect due to C^2R is the same whether the conductor takes the form of a wire or tube, provided the sectional area and the length are the same; heat losses are for the moment ignored. The mass of metal in a standard wire fuse being fixed, the C^2R effect can result in a temperature rise only until actual fusing point is reached. Copper, or other metal, deposited on a wax support is governed by a new set of conditions, namely, the C^2R effect upon the wax support.

Mr. A. G. Bullen

The mass of wax supporting a given section of copper requires a definite amount of heat to soften it, within limits and always provided the current carried by the conductor is less than the direct fusing current for an equivalent wire. The greater the mass of wax employed, the lighter will be the deposited conducting coat, the greater the heat dissipation externally, and the less the heat absorption by the wax support. Thus time lag can be obtained or the current surges caused by starting a motor directly from the line can be sustained without increasing the capacity of the fuse under normal load conditions. The limiting factors depend upon the nature of the wax employed and its physical characteristics; broadly, these are the softening point at which the weight of wax will break the very light conducting coat deposited on it, or the expansion of the wax and other pressure effects which will disrupt the coat long before the actual fusing point of the metal is reached.

Compared with the melting point of copper, a wax fuse operates at a low temperature and is not subject to oxidisation or to appreciable changes in ohmic resistance, which is a consideration for fuses of the smallest capacity, such as for instrument circuits. The wax also prevents corrosion. Further details of electroplated wax fuses will be available when experiments now being conducted have furnished more data.

In the use of the principle for switch actuation the heating effect of a current carried by a conductor is directly applied to a wax substance associated with the conductor. The most convenient form of conductor is a spiral spring, placed in, for example, a tubular container filled with a suitable wax substance. When the wax hardens, the spring heating coil is firmly embedded in it and makes a very convenient thermal element in a form to restrain movement of a switch mechanism. Switches have been made and provided with a catch mechanism attached to the wax thermal element. The load current is wholly or in part carried by the heating coil, which under normal load conditions, including initial starting surges, remains sufficiently resistive to movement.

The effect of an excess load is to add heat gradually to the wax which becomes less resistive to the movement of the convolutions of the spring heating coil until sufficient movement has taken place to permit the catch or trip mechanism of the switch to be actuated. The elements and catch mechanism are designed to apply strain to the heating coil element just before the switch operates; the inherent disposition of the heating coil is to return at once to its "set" position before the wax can cool and reharden. Thus a gradual excess load effects slow release of the switch mechanism and has a long time lag characteristic. A heavy excess load causes the convolutions of the spring heating coil to reach a high temperature very quickly, and the wax immediately in contact with it is liquefied, the spring reaching the tripping position long before the general mass of the wax has been affected.

Details of Tests

Since a principal application of small current overload switches would be the protection of fractional h.p. motors, a thermal release must operate at one ampere or less, and the element must not be damaged if the circuit through it is subjected to a short-circuit surge, provided a fuse is also in the same circuit. The fuse would be of not less than 5 A under normal factory conditions. The following tests were carried out:—

No. 1.—A small three-pole a.c. type of push-button switch was fitted with a trip mechanism actuated by a 0.5-A wax thermal element. D.c. at 230 V was used for testing since a.c. was not convenient. The switch tripped in ten minutes with a load of 0.55 A, in two minutes with 1.0 A, and in fifteen seconds with 3 A. A 3-A fuse (32 s.w.g. lead) was placed in series with the switch and a 3-A load applied; switch and fuse operated together. A short-circuit test was applied with a single 32 s.w.g. lead wire in series, with the main circuit breaker set to trip at 90 A; switch and fuse operated together. When the switch was tested for normal load it was found that the time-lag characteristic had not been influenced. The short-circuit test was repeated but with a double 32 s.w.g. lead fuse wire in series. The wax controlled switch tripped instantly, but the arc was maintained across the contacts (d.c. being applied to an a.c. switch). The double fuse failed in approximately a second, the thermal element was undamaged, though the switch contacts naturally had suffered.

No. 2.—A switch having ample breaking capacity was fitted with a 1-A wax trip, the fuse in series was 34 s.w.g. copper; a short-circuit was applied and the switch tripped before the fuse failed. Several tests with various switches confirmed the speed of operation under severe overloads.

No. 3.—For a very small current a switch was designed to employ a light wax element, and overloaded to ascertain the destructive load. This switch operated with a load of 130 mA in five minutes, and instantly with loads of 0.25 A and upwards. The element was unaffected up to 2.5 A but fused at 3 A above the level of wax; repairs were effected and the 130 mA load again applied when the time lag was found to be unaffected. Thus no damage takes place with an excess load up to 2,000 per cent. with small capacity wax elements.

No. 4.—The switch was tested to ascertain percentage of overload which would actuate it over a period; the continuous load was 0.8 A. The load increased from 0.8 A (wax warm) to 0.9 A when the switch opened after five minutes. At 12 A the switch instantly tripped but the time lag characteristic was not upset.

Rapid Resetting

Under commercial operating conditions, a replaceable circuit fuse is not likely to be less than 5 A. A switch designed to trip at 0.5 A in five minutes withstood five direct line starts per minute controlling a 160-W 230-V series-commutator motor, employed in vacuum cleaners, and tripped on load in three minutes.

For actuating 1-A switches less than 1 watt was required for a few minutes, *i.e.*, less than one B.th.u. is required to change the wax element from resisting movement of the trip mechanism to actuation of the switch. Resetting is also quickly effected because the heat content of the wax is so small that

once the circuit is interrupted it is dissipated and the wax regains the state when the switch can be reclosed. With a slow overloading and a long time-lag actuation, about twenty seconds is required for the element to cool off. After a severe overload the switch may at once be reset, excess-load heating being more localised, due to the thermal conductive properties of the wax preventing general absorption of quickly generated heat at the convolutions of the heating coil.

The wax used in the tests and experiments described is a special preparation produced by Imperial Chemical Industries, Ltd., the melting point being 250 deg. F. and specific heat 0.2. A high melting point for the wax avoids the influence of changes in the temperature of the surrounding air. Although atmospheric changes in temperature between 30 and 70 deg. F. appear to be an appreciable percentage of the melting temperature at 250 deg. F., only the time-lag period is varied with normal outside temperature changes, the wax employed remaining consistently hard until very close to the melting point; *i.e.*, the "plasticity curve" does not follow a temperature curve. The operating factor depends upon the effect of a definite quantity of heat upon the physical property of a wax sample. Apparatus is therefore designed to be actuated according to the physical state of the wax, that is, the electrical conditions only apply indirectly.

Applications of the wax thermal system have been patented not only in respect of fuse and switch actuation due to the normal passage of current, but in addition for indirect actuation to deal with overheating in motors, transformers, &c. Switches are arranged to be affected by external temperature rise arising from "single-phasing" conditions or bearings, or from contact blocks. Eddy current can also be applied to induce a temperature rise in an iron core or steel spring, embedded in wax, and switches can be actuated by an unbalanced current effect.

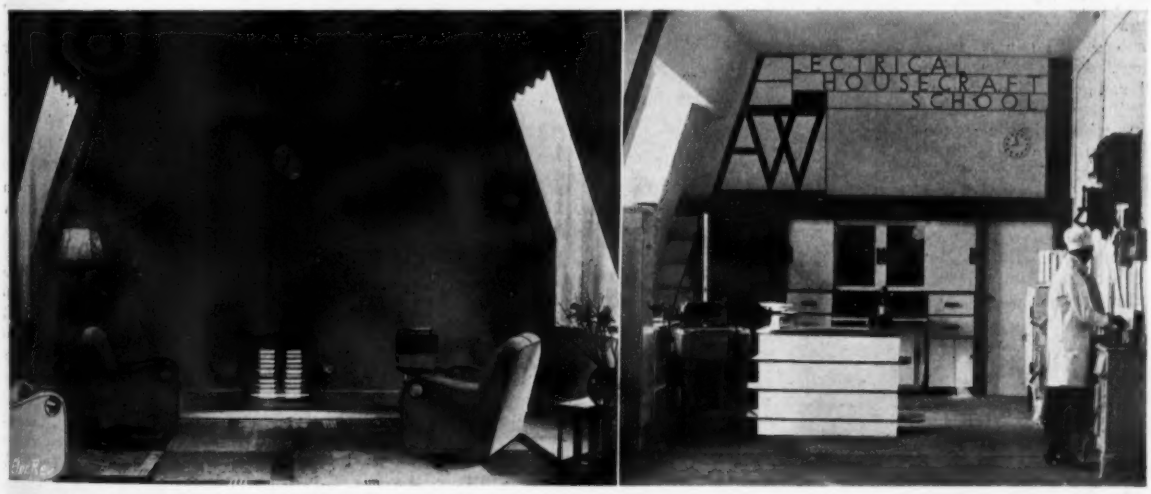
Tests are now being made with electroplated wax fuses. The Indiarubber, Gutta Percha & Telegraph Works Co., Ltd., has produced satisfactory fuses, but it is still necessary to establish the relationship between fusing currents and thermal properties of wax on similar lines to those established with the switches described.

The New E.A.W. Headquarters

THE new headquarters of the Electrical Association for Women at 20, Regent Street, S.W.1, was opened on Tuesday afternoon. Situated just south of Piccadilly Circus, the premises will give much more accommodation and will be more convenient of access than the former offices at 46, Kensington Court.

The principal rooms are the club room, in which the two distinct aspects of "lounge" and "study" are suggested by the difference in decorative features; the committee room, which can be combined by the removal of partitions with either the club room or the kitchen, or both; and the kitchen, which has been laid out on fatigue-saving lines. The end bay of the club room is lighted on the indirect system and floodlighted. A 15-A point provides for spotlight or other temporary fittings for dramatic entertainments, &c., and floor and desk standards and two central globe ceiling fittings give additional illumination.

Similar globe fittings are also used in the committee room and the kitchen. Lighting for demonstrations is given by strip-light and a spotlight on the lecturer's table. A long cupboard for vacuum cleaners and floor polishers is illuminated automatically when the door is opened. In the kitchen is a clock meter for checking the consumption of any electrical apparatus. The handsome lighting fittings, supplied by Messrs. Troughton & Young, Ltd., in the director's office strike a distinctive modern note. All the staff offices are equipped with desk and general lighting, electric clocks and plug points.



The "Cosy Corner" and the demonstration kitchen at the new E.A.W. headquarters. Miss Anna Holm, the chief lecturer in the Electrical Housecraft School, is seen operating a cooker

The Electrical Housecraft School

The electrical housecraft school has been equipped for special lectures to suit varying requirements and for research work; the electrical apparatus in use will be changed from time to time. A library of books on home economics has been started, and will be kept up to date with works published in all countries on the subject. Loans of electrical apparatus have been arranged through the B.E.A.M.A.; the wiring installation was provided by the E.C.A. (carried out by Messrs. Pinching & Walton); cable and wiring supplies through the C.M.A.; lighting fittings through the Electric Light Fittings Association; and lamps through E.L.M.A. The lighting installation was planned by the Lighting Service Bureau.

The Opening Ceremony

In opening the new premises, Lady Moir (president, E.A.W.) referred to the origin of the Association, eight years ago, under the guidance of the present director, Miss C. Haslett. In 1926 a scheme was laid before Sir Hugo Hirst, Bt., who had expressed the view that an institution of domestic and industrial engineering should be formed to train young people in the use of electrical equipment. The financial guarantees that made the taking of the new premises practicable were due to the General Electric Co., Ltd. (on Sir Hugo's recommendation), Associated Electrical Industries, Ltd. (on Sir Felix Pole's recommendation), and the London Electric Supply Association (on Mr. J. C. Dalton's recommendation). The members of the E.A.W. had provided the preliminary furnishings and had opened a subscription list to carry on the good work. The equipment of the premises had been made possible by the co-operation of all branches of the electrical industry. The new headquarters would provide a centre where London members could meet those of other branches and for the holding of lectures and large meetings.

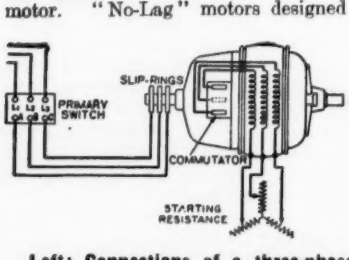
The success of the E.A.W. Grade I Demonstration's Diploma and the suggestion that similar diplomas should be available for teachers and housekeepers had made imperative the provision of facilities for special coaching classes, lectures, etc., and the Electrical Housecraft School would provide these.

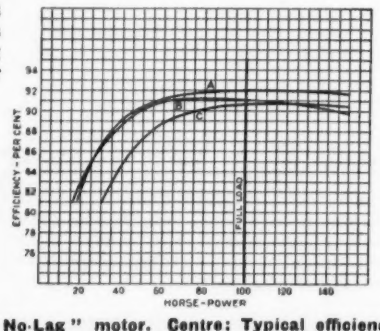
Those requiring further information on the Association's scheme of practical training in domestic electrification and the E.A.W. Grade I Certificate should obtain the pamphlet "Showroom Training for Women in the Electrical Industry" (price 6d.) from the E.A.W. It is suggested that trainees should receive a salary of 30s. per week for a two-year agreement, and after completion of the course from £2 to £3 per week.

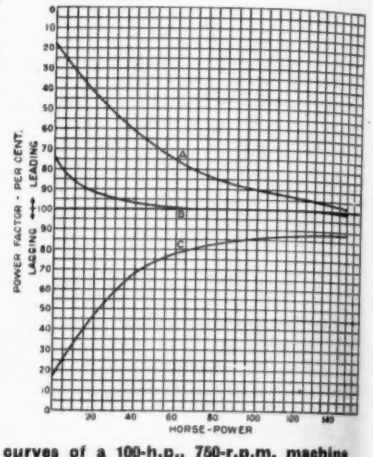
Power Factor Correction Motors

FOR correcting low power factor on circuits not exceeding 650 V, especially where the plant is too small to justify the expense of a synchronous motor or condenser with its attendant switchgear, the B.T.-H. "No-Lag" motor has been developed. This machine is operated at unity or leading power factor by means of a commutator and commutator winding. It is comparatively inexpensive since a separate exciter is not required, and it is as simple in design and as easy to operate as an ordinary slip-ring induction motor. It is started in the same way, and the maximum (or pull out) torque is considerably greater.

This type can be designed for any power factor required. As it is asynchronous, its elasticity of operation will prove more suitable for many applications than the inelastic synchronous machine. At unity power factor the efficiency is usually higher than that of the slip-ring motor. "No-Lag" motors designed for unity power factor maintain it down to approximately half-load, below which it is slightly leading. When designed for leading power factor, the efficiency falls somewhat, depending upon the amount of leading current supplied; at 90 per cent. leading power factor, the efficiency is usually the same as that of the corresponding slip-ring motor.







Left: Connections of a three-phase "No-Lag" motor. Centre: Typical efficiency curves of a 100-h.p., 750-r.p.m. machine (A. "No-Lag" motor at unity p.f.; B. slip-ring motor; C. "No-Lag" machine at 0.9 leading p.f.). Right: Typical p.f. curves of a 100-h.p. "No-Lag" (A. "No-Lag" motor, 0.9 leading p.f. at full load; B. unity p.f. at full load; C. slip-ring motor)

The economies to be effected by correcting low power factor are shown by an installation carried out by the British Thomson-Houston Co. at a factory in which induction motors totalling about 300-h.p. had already been installed. The tariff was based on maximum kVA demanded, which was 176 kVA for the last quarter. For driving new plant 80-h.p. of new motors was required. Squirrel-cage induction motors were used for the smaller powers, but two machines of 50-h.p. and 15-h.p. were of the "No-Lag" type, designed for 90 per cent. leading power factor. At the same time two existing induction motors of 50-h.p. and 15-h.p. were replaced by "No-Lag" motors of the same ratings, and also designed for 90 per cent. leading power factor. After the new motors had been added and the conversions made, the maximum demand for the next four quarters was 176 kVA, 170 kVA, 176 kVA, and 174 kVA respectively. Thus, although the installed h.p. was increased from 300 to 380, the maximum kVA remained approximately the same; if induction motors had been used instead of the four "No-Lag" motors, it would have increased by about 50 kVA. The saving in cost of power is approximately £200 a year. The manufacturers claim that where charges for power are on a kVA basis, the extra cost involved in installing "No-Lag" motors instead of induction motors can be saved within a year.

A 100-h.p., 320 r.p.m. "No-Lag" motor driving an ammonia compressor in a brewery

The Mode of Operation

The primary winding of the "No-Lag" motor is on the rotor, and the secondary winding on the stator, the supply being fed to the rotor through slip-rings. In addition to the primary winding, a compensating winding is wound in the same slots on the rotor. This winding is provided with a commutator and brushes through which it is connected in series with the stator winding. The commutator voltage, constant in magnitude, is thus injected into the secondary circuits and produces currents which cause the primary current to alter in phase, thereby improving the power factor of the motor. The phase of the commutator voltage can be altered by varying the brush position, which controls the amount of correction.

"No-Lag" motors can be built in all sizes up to about 1,000-h.p. for single-phase, two-phase, or three-phase circuits up to 650 V at any frequency, and arranged for horizontal or vertical operation. With slight modifications they can be designed to run at a fixed speed, or at a number of different fixed speeds between normal synchronous speeds, *e.g.*, 50-cycle speeds of 1,200 or 800 r.p.m. which are not obtainable with ordinary induction motors. Motors arranged for operation at intermediate speeds are not intended for power-factor correction, but the power factor at full load is still high.

An Asynchronous Condenser

This type of motor can be designed to give any desired leading power factor up to practically zero leading. When running light at zero leading power factor it acts as an asynchronous condenser, drawing for the system a leading wattless current that is adjustable in amount from zero to that corresponding to the full kVA rating of the machine. The advantage over a synchronous condenser is that it is started as an ordinary induction motor and synchronising is not necessary; it is also less sensitive to changes of frequency and voltage.

The "No-Lag" motor can also be driven as a generator, which has a greater maximum overload capacity than the corresponding induction generator, and can be designed to operate at any required power factor. The B.T.-H. Company commenced to manufacture motors of this type in 1925, and those in service at the present time total nearly 50,000 h.p.

A Diesel-electric Tug

An interesting type of tug, with Diesel-electric propulsion, for service on the Thames, is being constructed by Henry Robb, Ltd., Leith. The vessel will be 92 ft. long by 22 ft. beam, and is for the petroleum lighterage service of the Union Lighterage Co., Ltd. Two Diesel engines, each direct coupled to a main and auxiliary generator, will provide the power, which will be transmitted to a single screw propeller by a direct-coupled 580-b.h.p. electric motor. The Diesel machinery will be provided by Messrs. Mirrlees, Bickerton & Day, and the electrical equipment by the British Thomson-Houston Co., Ltd.

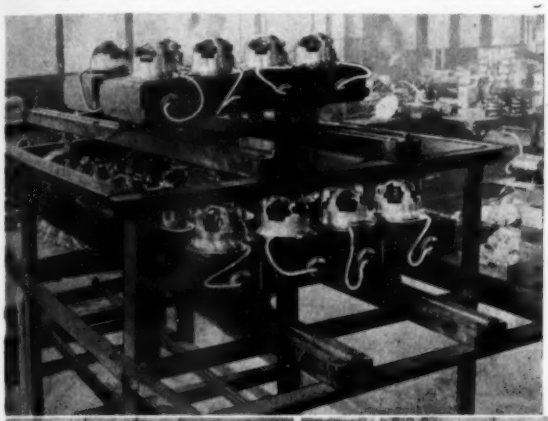
Electricity in Mass Production

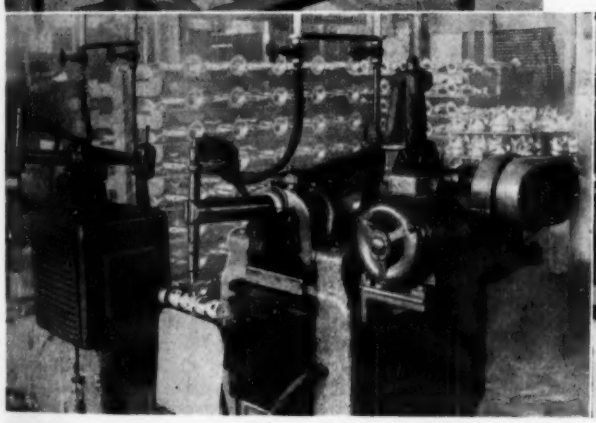
A London vacuum-cleaner factory

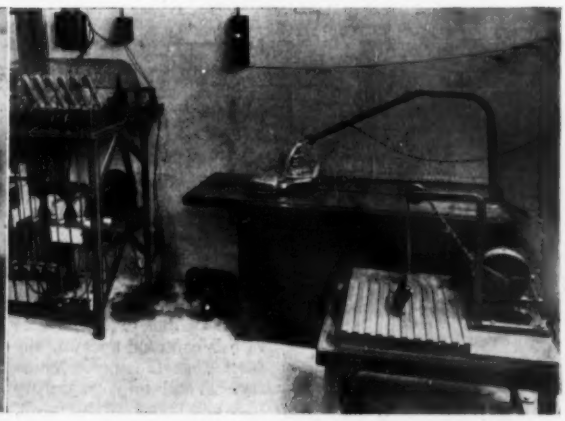
ONE of the best examples of mass production to come under our notice is that involved in the manufacture of electric vacuum cleaners at the new factory at Ealing of Hoover, Ltd., which, although not yet completed, is already in production fairly extensively. It is a two-storey building adjoining the office block which we have already described.

Practically all the component parts are made by the company, the most interesting from the electrical point of view being the motor. Coils are wound on motor-driven machines which automatically "cut out" when the required number of turns has been made. The number of segments in the hand assembled commutator units are checked by weight, and the connections between coil-ends and segments are made by mass dipping; the latter are oxidised to avoid tinning.

Testing the motors in their housings is another "bulk" job, groups of machines being run for long periods in a structure fitted with pick-up current rails. Electro plating is also a large and important part of the processes, and an extensive layout is served by a Canning machine with an output of 2,750 A at 5/10 V.







The picture on the left shows a number of vacuum-cleaner motors being tested under load. Below, the left-hand illustration is of two spot welding machines and the other depicts various "rough-handling" methods employed in testing the machines

Castings for the frames, &c., are received from outside and polished on ingenious multiple machines. We saw about eight facings on the interior of a dome-shaped machine end bracket made in one sequence of operations.

Obviously electric spot welding facilitates production, and machines are engaged, *inter alia*, in fixing the necessary rivets to the runners secured to the revolving members carrying the brushes under the machines. The runners are super case-hardened by a special dipping process, but to prevent hardening of the rivets also these are previously copper plated. There are electrically driven sewing machines engaged on dust-bag making which seam the material and also bind it with twill in one major operation.

The attention given by the organisation to the testing of all materials and parts used or under consideration for use in the final product surpasses anything of the kind we have seen. In the testing room there are numerous machines with individual electric drives running continuously and doing their best to "work to death" various parts. Through a crank gear one motor continuously operates a bank of switches with suitable mechanical connections. Something like 12,000 operations without damage are expected from a good switch. In another instance cushioning springs are alternatively compressed and released. A complete vacuum cleaner is positively ill-treated by being run to and fro over rectangular metal bars placed crosswise on a metal plate. A day's treatment on this machine equals X miles which represents Y years of service by, one would think, a very careless maid.

The winding out and up of the connecting lead by the user is reproduced continuously in similar fashion, and so on with various other parts. A band of cleaners for testing such miscellaneous articles as ball bearings are run seven minutes "on" and one minute "off" continuously under the control of a motor-driven cam-operated switch.

The company generates its own electricity and has installed two Crossley-E.C.C. five-cylinder, 312-kVA, heavy-oil engine sets. Generation is at 400 V, and the present maximum load on the station is 350 kVA. The bus-bar generating cost is 0.8d. per kWh. Waste heat from the engine exhausts is utilised for warming the offices, &c. There is a small 6.5-kW Crossley-E.C.C. automatic set for pilot lighting and emergency work. The Uxbridge Electric Supply Co. gives a supply of floodlighting which is provided by projectors made by the Wardle Engineering Co., Ltd.

Copper-oxide Rectifiers

THE copper-oxide rectifier has now been in use long enough to enable it to be said that its characteristics are not seriously affected by ageing. This conclusion is supported by the results of tests, made by H. Böhn and reported in *Electrotechnische Zeitschrift*, extending over a period of 17,000 hours' service. These tests also show that the copper-oxide rectifier has special advantages in the trickle-charging of accumulators, and is readily adaptable to measuring purposes. At the normal room temperature (22 deg. C.) the reverse current in the case of a battery-charging rectifier was 0.3 per cent. initially, and 3.3 per cent. after 12,800 hours' service, with the a.c. supply disconnected. By using these rectifiers in Graetz connection (a bridge-circuit arrangement of four or more valves utilising both half-waves) and supplying them through a transformer with variable secondary tappings, the desired steady output can be maintained whatever the nature of the load and regardless of ageing effects and variations in manufacture. In general, the Graetz connection is preferable to the potential divider connection for copper-oxide rectifiers, unless the d.c. voltage is so low that a smaller number of rectifier plates can be used.

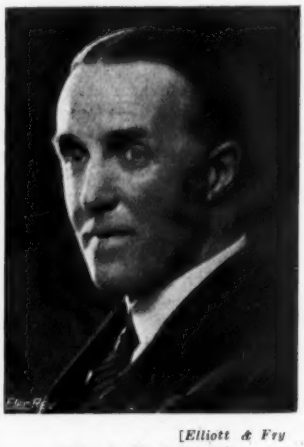
Owing to the different voltage requirements, copper-oxide rectifiers cannot be connected to existing transformers for hot-cathode rectifiers. The copper-oxide rectifier acts as a ballast resistance, giving an automatic increase of voltage on the battery as the charging current diminishes. As a consequence, the rated voltage of the rectifier may be lower than that of a hot-cathode rectifier for the same service, and the losses in the ballast resistance of the latter are avoided. The maximum efficiency of the copper-oxide rectifier (about 65 per cent.) is reached in the range 40-70 per cent. full-load current, which coincides with the usual range of charging current in continuous-charging outfits. By suitable connections, the charging current can be brought to zero at 2.2 V per cell, and it is even possible to obtain full range from maximum to zero current with only 2 per cent. voltage increase, thus equalling the performance of a relay, but without any moving parts. With regard to its general operating qualities, the copper-oxide rectifier is comparable with the static transformer, and it appears that these qualities are fully maintained in rectifiers for currents up to about 100 A and pressures up to 220 V d.c.

MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

Remedies for Slow Development

A PAPER was read at last evening's meeting of the INSTITUTION OF ELECTRICAL ENGINEERS by Mr. J. M. Kennedy and Miss D. M. Noakes entitled "An Analysis of the Costs of Electricity Supply and Distribution in Great Britain, with Some Suggestions as to the Causes of and Remedies for the Slow Rate of Development."



[*Elliott & Fry*

Mr. J. M. Kennedy

The authors show that within the first ten years the percentage of distribution capital to the whole has increased from 49.3 to 57.7. The total capital has increased by 145 per cent. to £335 million, but whereas expenditure on generation has risen by 100 per cent., that on distribution has advanced by 185 per cent.

The number of kWh sold per £ invested has improved from 44.7 to 64 for generation, but only from 46.0 to 46.8 for distribution. Although the electricity sold has advanced by 200 per cent. (to 9,074 million kWh), the total cost of generation has increased by only 16 per cent., but for distribution the increase is 150 per cent., and its total is now more than one-half (as against less than a third in 1921-22) of the aggregate cost of electricity supply.

Generation expenses have come down from 1.69d. to 0.676d. per kWh sold, but distribution expenses only from 0.812d. to 0.706d. Revenue as a percentage on capital has dropped to 18 from 31.5 for generation, and to 13.8 from 15.5 for distribution. For undertakings with a distribution capital of less than £250,000, costs may be over 25 per cent. of the capital instead of 13.8 per cent.; where the capital exceeds £1,000,000 the upper limit is 15 per cent. There are to-day 663 authorities with an average distribution capital of under £300,000. Several curves are given to show the stimulating effect on consumption of lowered tariffs both at home and abroad.

The number of inhabited houses is about 11 million, of which 3.3 million are served by authorised undertakings, so that of the total of 4 million consumers 82 per cent. are domestic, taking an average of 830 kWh each per annum. With attractive tariffs the existing domestic consumers should take 5,500 kWh each, and 75 per cent. of the remainder might be connected within five years.

Although the average sales amount to 46.8 kWh per £ of distribution capital there are 113 local authorities and 278 companies (representing 40 per cent. of the total number of undertakings) which sell 25 kWh or less per £ with distribution costs rising in many cases to over 2d. per kWh. The grid tariff should permit electricity supplied so as to increase the load factor to be sold at from 0.25 to 0.3d. The immediate adoption of two-part tariffs assisted wiring, and hire of apparatus schemes by all undertakings is strongly advocated. The primary charge of the tariff should be based on floor area, and the secondary should be a block charge with maxima of 1d., ¾d., and ½d. per kWh.

The authors have no doubt that distribution powers should be vested in single authorities with wide areas based on those of the grid, and in no case with a distribution capital of less than £2,000,000. The formation of distribution boards, each consisting of five members nominated by the Ministry of Transport, and working in conjunction with a similar central distribution board, is suggested.

Electricity on the Farm

AT the informal meeting of THE INSTITUTION OF ELECTRICAL ENGINEERS, held on January 23rd, Mr. F. C. Raphael was in the chair, when Mr. F. E. Rowland opened a discussion on "The Use of Electricity in Agriculture." He exhibited slides showing well-equipped farms and some unusual but practical applications of electric motors, both portable and fixed. Mr. Rowland said that in spite of depression the agricultural industry was still one of the largest in this country, and was the most important basic industry. Total imports during 1931 were over £800,000,000, and food, drink, tobacco, coffee and other agricultural produce accounted for no less than £450,000,000. By improved methods and scientific development a large proportion of these commodities could be produced at home.

[*Fox Photos.*

Mr. F. E. Rowland

Signs were not wanting that conditions in agriculture would improve, and, when they did, the use of electricity by those engaged in the industry would rapidly increase. It was undoubtedly more satisfactory for the farmer to obtain power from a public supply, except in cases where farms were so isolated that linking up was not economically possible. In rural districts where public supply was available, the charge of about 2d. per kWh, if energy were used in reasonable quantities, might be regarded as attractive, although a simple two-part tariff with a low unit charge was preferable. As regarded the latter, the assessment of the standing charge was important, and should be done so that it was understood by the layman.

One of the principal avenues through which agricultural development might be looked for was the introduction of lighting, heating and labour-saving devices into the farmer's home. The benefits of electricity in the home were quickly appreciated by the farmer's wife, and its extension to the farm buildings was bound to come. Exhibitions of electrical apparatus in market towns, together with persistent canvassing, had been found to lead to satisfactory development. Many farmers were anxious to obtain a supply of electricity, because the existing methods of lighting on their farms were still of the crudest description.

The Versatile Electric Motor

Electric motors for driving barn machinery had many advantages. The majority of motors at present were required for converting countershaft drives. Unless exposed to the weather, or working in an excessively dusty atmosphere, protected machines were adequate, but any large openings in the frames should be enclosed with expanded metal for mechanical protection and to prevent the entry of vermin. Portable motors had their uses, particularly for driving machines scattered in various parts of farm buildings. For occasional use a

A window display designed by the French O.C.E.L. to popularise the small domestic circuit breaker. The lights fail and a visitor says "Now it will be necessary to replace the fuse!" The hostess replies "Oh, no! we have a little circuit breaker"

mobile unit might be arranged by mounting the motor and control gear on skids.

A demand would no doubt arise for machines specially designed for electric drive with built-in motors, but up to the present the market for such machines did not warrant their manufacture. The largest standard drive for which electric motors were adaptable around farm buildings was threshing. As a rule, motors of 15 h.p. to 20 h.p. mounted on trucks of robust construction were used, and by this method economies of the order of 10s. a day had been effected. Fractional horse-power motors for small applications were a great convenience, and quickly saved their first cost. Pumping was an application in which, by means of float switch control, a permanent water supply could be provided at a very small cost. An adequate supply of water was of great importance on farms where stock was kept and had a considerable influence upon the quantity of milk produced.

In poultry farming electricity could be used for a number of purposes, including incubating, brooding, lighting poultry houses, warming drinking water and plucking. For beating incubators and brooders electricity offered considerable advantages compared with other methods, entirely eliminating the labour for handling fuel and cleaning and trimming lamps. Lighting poultry houses for increasing egg-production was well established. Automatic control was recommended, because to obtain the best results regularity of operation was of the greatest importance.

Interesting work had been done in connection with heating the soil by electricity for stimulating the growth of plants, including market garden produce. In some countries, particularly in Scandinavia, considerable developments had taken place, and extensions of that application should be made in this country, where enterprising growers were anxious to obtain a larger share of the early market for highly priced vegetables. As this application could be used during the night only, soil heating offered a means of developing off-peak load. Experiments had been made with various forms of electric light for stimulating and controlling plant growth, and, although that application had not reached a commercial stage, interesting results were foreshadowed.

During last week's frost night skating on the lake in Queen's Park, Blackburn, was facilitated by the installation of powerful lamps at 50-yd. intervals by Mr. W. A. Royle, the borough electrical engineer

Creameries the Nucleus for Rural Electrification

THAT any audience could listen for three hours to a technical paper and discussion thereon without dwindling and even without shuffling or coughing or whispering is the best proof that Mr. C. R. Stewart, A.R.C.Sc.I., not only chose an interesting subject when he lectured on "Creamery Electrification" recently to the ASSOCIATION OF UNIVERSITY ELECTRICAL ENGINEERS in Dublin but is comp'ete master of his subject. Our Dublin correspondent says that Mr. Stewart expressed his intention of writing another paper after studying with greater thoroughness the results of the coming season's work in the electrified creameries of the Irish Free State.

While the subject indicated by the title of the paper is full of interesting difficulties, and affords scope for endless discussion and wide investigation, the author used it correctly as an introduction to the much greater subject of rural electrification in the widest sense. The national distribution network in the I.F.S. covers areas which in England undoubtedly at present would be classed as almost too sparsely populated, and with centres of population too far apart, to be considered worth troubling about; but the time is at hand when standards in England will be scaled down to include areas which are now ignored for apparently good reasons. At the same time in Ireland efforts will be made to cover far wider areas of the most "backward" country, and it is as one of the workers towards that goal that Mr. Stewart sought the opinions and gained the unanmous approval of his audience, which included people who were well up in the subject.

A Rural Distribution Feat

There are several hundred creameries, *i.e.*, milk separating and butter-making factories, in Ireland, each the centre of a small area of milk-producing agriculturists living in scattered homesteads, many of them some miles distant from the nearest aggregation of social units recognisable as a village. The original aim of the Electricity Supply Board was to deliver energy to every village of 500 inhabitants, and that has been accomplished already to a greater degree than many people thought possible; but it is now seen that even more is required to meet the conditions governing the agricultural economy peculiar to this country.

Up to the present time only twenty-five creameries have been electrified, and even they rely still upon coal-fired boilers for process heat and cleansing. Extension of h.v. lines to a creamery demanding perhaps no more than 50 h.p. may cost many thousands of pounds, which, taken by itself, is economically absurd; but Mr. Stewart and his co-workers urge that an intensive survey of these statistically poor districts, based upon creamery centres as nuclei, and taking into consideration every possible industrial and domestic prospect, may put a very different complexion upon the matter. There is a definite movement in Ireland towards decentralisation of industry, which is likely to gather force as the mineral and other natural resources are developed, so that a survey of the kind indicated could be entered upon hopefully. Another encouraging feature of the case is seen in the tendency to extend the social usefulness of the creamery by addding milling plant and general stores.

Dr. Kennedy, secretary to the Irish Agricultural Organisation Society, and a member of the Electricity Supply Board, speaking from personal knowledge, said that in Finland, Latvia, Czechoslovakia, and other similar agricultural countries almost complete electrification, industrially and domestically, had been attained, and it was necessary to discover how that had happened in order that the knowledge so gained might be applied to Ireland.

Single-sideband Radio-telephony

THE design and construction of a long-wave single-sideband telephone receiver for transatlantic working is described in the paper which Messrs. C. J. W. Hill and H. Page read before the London Students' Section of the INSTITUTION OF ELECTRICAL ENGINEERS on January 31st. The installation has been built by the General Post Office for receiving traffic from New York. Marconi plant is used.

As the carrier is resupplied by means of valve oscillators, it is essential that the latter shall be of constant frequency, in order that no appreciable distortion may occur in the detection of the incoming signal. The use of Horton oscillator circuits and double demodulation facilitates the stabilisation of the resultant resupplied carrier. Some measured frequency variations with filament and plate voltage-changes are given. High selectivity is obtained by the use of constant-impedance multi-sectional filters. The advantages of double demodulation are also considered from the point of view of filter design and manufacture.

Owing to the impossibility of designing filters with infinitely sharp cut-off, and the unavoidable "round-off" of the response characteristics as the frequencies of cut-off are approached, the cumulative degradation of the frequency-response characteristic

throughout the entire receiver has been equalised within ±1 decibel over the range of 250 to 2,750 cycles per sec. This equalisation has been achieved by the introduction of intermediate-frequency and audio-frequency equalisers.

The antenna system consists of four large loops and associated verticals at the corners of a rectangle, the short side being in the direction of the required signals. The combination of loop and vertical gives a cardioid polar diagram, and the resultant four cardioids are combined at the receiver to give the required directive characteristic. The combination of the signals from each loop is described, indicating how, by the use of delay networks, attenuators, and hybrid transformers, the correct polar diagram is obtained.

The valve-operated portions of the receiver and test equipment are worked from two sources of e.m.f. only, a 24-V battery for the filament circuits and a 130-V battery for the plate circuits. No grid biasing potential is required, as this is obtained through the drop in resistance in the filament circuits, the positive side of the 24-V battery being earthed. Each plate and filament circuit is provided with a fuse, and one or other with relays, which operate and light an alarm lamp should that particular circuit fail. Alarm lamps are also provided for indication when any fuse blows, and arrangements are made so that an alarm bell gives audible notification when any alarm circuit is operated. A metering system enables any plate or filament current to be measured.

The Future of Indian Main-line Electrification

IN the course of a paper read before the Indian Section of the ROYAL SOCIETY OF ARTS on Friday last, Mr. F. Lydall referred to the mistaken impression in Great Britain that the arguments in favour of suburban railway electrification do not apply to main lines. In Sweden, Switzerland, Italy, and Austria there is considerable main-line electrification but hardly any suburban. In India there are electric suburban services on three railways and electric working of main-line traffic on one railway to an extent unequalled in the Empire.

The suburban traffic of Bombay is uni-directional to and from the business quarter, and electrification was undertaken in order to encourage the development of the suburbs to relieve congestion in the city. The Great Indian Peninsula Railway (started 1925) has 43¼ route miles equipped and the Bombay Baroda and Central India Railway (started 1928) has 21¼ miles. The former had 238 million passenger miles to its credit in 1930-31, and the latter 230 million. The increase in the number of passengers carried annually in the three years following electrification was 29 per cent. for the G.I.P., and 2 per cent. for the B.B. and C.I., the smaller increase being due to electric services not having been started until 1928. Power is supplied from the hydro-electric stations of the Tata Companies.

In Madras the South Indian Railway completed the first stage of its electrification scheme in 1931. To avoid the expense of overhead equipment in the goods yard at Madras Beach, electricity for shunting locomotives is provided by two battery tenders. All power is purchased from the Madras Electric Supply Corporation. A scheme for a new suburban electrified line, with a view to avoiding congestion of local traffic, has been considered for Calcutta, but financial stringency has stopped progress. General particulars are given in the paper of the G.I.P. main-line electrification, which has been described previously in the ELECTRICAL REVIEW.

As regards the future, the minimum traffic density to make electrification remunerative has been estimated at two million trailing ton miles per annum per mile of single track, but the question is affected by the prices of locomotive fuel and electric power and the physical characteristics of the lines (the more severe these are, the greater the advantages of electricity). In the west and north-west of India coal is expensive, while near Bengal it is cheap. The price of electricity also depends upon the possibility of combining the railway load with the industrial load. It would probably be advantageous to extend the electrification of the north-eastern main line of the G.I.P. beyond Igatpuri to Nandgaon. This line contains such gradients as seven miles of an average of 1 in 145 and a maximum of 1 in 132.

[Killick & Abbot
Mr. F. Lydall

Other lines which may be electrified include those between Sibi and Quetta (with long stretches of 1 in 25 gradient). Between Kalka and Simla, the North-Western Railway (north of Lahore), and parts of the main lines near Calcutta. For many years to come there will be no justification for electrifying more than a small proportion of the 42,000 miles of railways in India.

Properties of Metal Coatings

THE testing of metallic coatings was the subject of a paper read by Mr. C. W. Burgman before the ELECTRODEPOSITORS' TECHNICAL SOCIETY recently. Two tests are employed (1) in the shop for inspecting the products; and (2) in the laboratory. At present the control of the product is limited to visual inspection or to current density and time of plating.

In research, many results are based on a few tests which may not determine the vital factors; the "accelerated corrosion test" is used indiscriminately and many new developments depend merely on the withstanding of this test. Individual tests should be developed that will reliably estimate each of the basic factors, and the manufacturer should put forward particular coatings for special uses. The useful life of a coating depends on: (1) The properties of the basis metal; (2) the properties of the coating metal; and (3) the mutual effects of the two. Changes in the properties may be caused by pickling, electroplating, and hot-dipping, and the fatigue limit lowered, but little is known of their fundamental nature.

It is time that a standard test was adopted for coatings which must have surface hardness; one test (Schuh and Kern) consists of determining the weight of carefully graded emery required to wear through a known thickness of coating with a standard velocity of air flow. The internal stresses inherent in electroplated coatings may be measured by coating one side of a thin metal strip and determining the induced bending. In the Erichsen ductility tester, a metal sheet coated with the finish under test is deformed by a spherical ball. The amount of deformation which the coating will undergo without breaking gives a measure of its brittleness. Porosity is difficult to detect in coatings such as zinc and cadmium, but below a critical thickness of plated coating attack by strong electrolytes is accelerated (W. S. Patterson and S. Wernick). There is definite need for a test to give a direct, comparable measurement of the adherence of the coating to the basis metal.

A limit is imposed on the combinations of metals, such as zinc and copper, by their capacity for diffusion at ordinary temperatures, and an undercoating of some other metal is needed, but if the movement of one metal into another takes place only at high temperatures, alloy coatings can be formed by "controlled diffusion." Coatings formed by hot dippings are often composed of layers of alloys with pure metal outside. The coating usually adheres well but is often brittle and examination by microscope is very important.

The Installation of Modern Cables

THE development of the electric cable from 1881 to the present time was reviewed by Mr. J. M. Dunkley, of Callender's Cable & Construction Co., Ltd., in his presidential address to the BIRMINGHAM ELECTRIC CLUB on January 27th. Mr. Dunkley said that steel-wire armoured or taped cable had been laid direct in the ground for a great number of years and the armour had proved itself sufficient to withstand accidental damage by workmen excavating the ground, although the protection was not sufficient to deflect any direct blow of considerable force. The damage done by water or gas in previous systems was practically non-existent with the direct laying method, which was also cheaper.

The speaker also dealt with the "pre-spiralled" conductor, in which the shaped or segmental conductor was produced in the stranding machine and given the necessary spiral prior to insulation and laying up in the multicore cable. Its advantage was the elimination of latent stress in the conductor which would cause rotation or displacement; further, multicore cables made with pre-spiralled conductors were more flexible, which was of great advantage when a cable was of a large sectional area.

After referring to the latest developments in sheathing, armouring and waterproofing, Mr. Dunkley said that it was a matter of conjecture whether we had reached the commercial limits with a working pressure of 66-kV for cable employing a solid dielectric (*i.e.*, a normally stranded conductor insulated with layers of paper dried and impregnated prior to lead sheathing) but that we had in the oil-filled and gas-filled cable the means at our disposal for the satisfactory transmission of power by underground cables at pressures in excess of 132 kV.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

A Horrible Example

I have read quite a lot of correspondence recently about supply undertakings, progressive and otherwise, and I think that I can touch on something new. I was born in a fairly large mining village in the county of Durham about six miles from the sea and, like any ambitious youth, cleared out as soon as possible. Before I went, a supply of electricity was made available to the village by an extremely ugly overhead distribution system, the local coal company being the suppliers; the price was 6d. per kWh.

This was about fifteen years ago and on revisiting the place last summer I was shocked and filled with something like despair for the inhabitants. The place was three times as big, but electrical development was absent. There were the same ugly overhead lines in a terrible state of repair and the price was still 6d. unit for lighting, heating, cooking, or any purpose. Naturally, cookers, electric fires, water heaters, &c., are unknown, and electric irons a luxury. The coal company will not grant low rates for heating, &c., and as gas is not available, everything means using coal, which, of course, suits the company. The street lighting is a wonderful example of how not to do it.

I wonder how long these people will be deprived of the advantages of electricity by a selfish coal company. The surrounding villages are more fortunate, being supplied directly by a supply company proper. Another thing I must mention is that while a supply has been available for fifteen years, the L.N.E.R. station is still lighted by oil lamps, although the supply passes within ten yards of the railway premises.

In another part of the county of Durham 20,000-V transmission lines have been in operation for about twenty-five years and pass by a small village, consisting of about six farms and twelve cottages. A few years ago a transformer house was erected and the transmission line tapped to provide a supply for a neighbouring village, an underground feeder being laid for about three-quarters of a mile. All the farmhouses and cottages referred to are within 500 yards of the sub-station. Why was not supply made available for this village? T. W.

January 29th.

Contactor Starters

With reference to "Dilemma's" recent query, whilst admitting that there are certain situations where push-button contactors are more or less essential, from the maintenance standpoint, there is no comparison between this type and the "direct-on" oil-immersed starter as regards reliability and freedom from breakdown. The automatic type is housed in a pressed-steel or cast-iron housing of not more than 11 in. by 7 in. by 5 in. (I am taking the standard 5-h.p. range); hardly any room is left for cable connections, and if fitted with overload dashpots the operation of inserting these when full of oil is more than difficult. In short, they are mu·h too small and flimsy. I have a number of them in use with solenoid and thermal overloads, and write from experience.

In the oil-immersed breaker (of which there is one on the market with two overload and one no-volt coils cheaper than the corresponding automatic one at 5 h.p.) there is ample room for cables and conduit making off, positive overload, and no-volt protection, combined with that feeling of "robustness" which is entirely absent with the automatic type.

During the last six weeks I have replaced four contactor starters (p.b. type) with direct-on oil-immersed breakers on two 2-h.p. and two 5-h.p. a.c. motors. These were in service on a foundry sand-mixing plant, and their life has been approximately twelve months. The causes leading up to their replacement were: Flashing over between the contacts on the insulating base; inefficient arc shields; continual sticking of the tripping bar, the return spring being much too small; continual complaints when repairs were necessary owing to their cramped construction; and they were not dust-proof.

On the other hand, I have a large number of oil-immersed breakers, both direct-on and star-delta, which give me no trouble year in and year out. I should point out that my experience has been obtained in connection with a plant of 280 motors of various sizes from 2 h.p. up to 20 h.p., these motors being started and stopped by attendants about twenty times a day. CARDIFF.

January 25th.

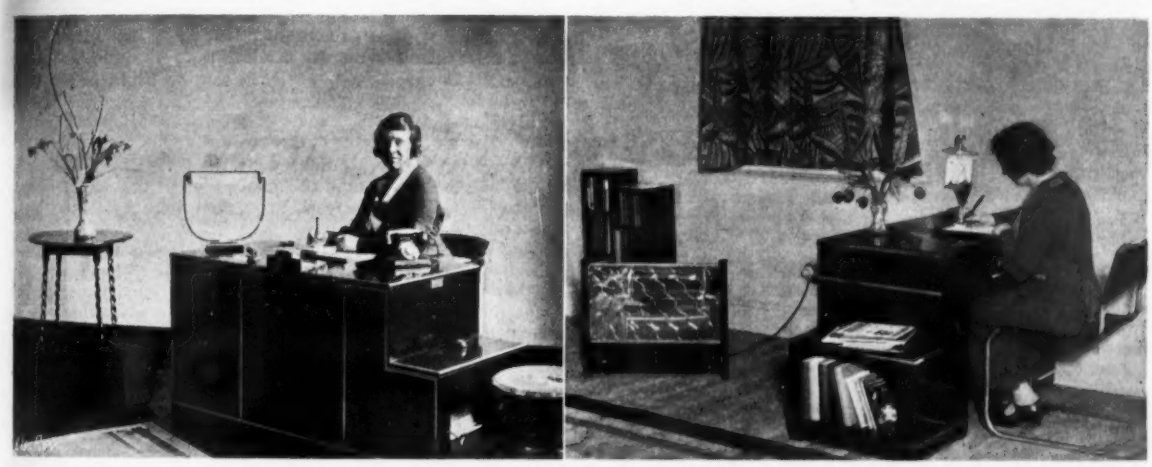
A Business Opportunity

We are shortly commencing a rather ambitious rebuilding scheme (£10,000) of a large block of property in the centre of Blackpool which is to comprise our idea of an up-to-date electrical contractors' premises. The building will be a four-storey front block on the main street, the ground floor of which will be for shop purposes and the first and second floors for showrooms and the third floor stores. The middle block is a three-storey building, the ground floor of which is for stores and the two upper floors for offices. The back section will have two storeys, the ground floor of which is for an electrical service garage and the first floor for workshop accommodation.

It is our intention to equip the building electrically in the most up-to-date manner, using different systems of lighting and heating for each section so as to be suitable for demonstration as well as utility purposes and we are desirous of getting in touch with manufacturers who are prepared to co-operate with us in supplying suitable equipment for this purpose. We shall require various types of outdoor signs, shop-window lighting, shop lighting, showroom lighting, office, stores and garage lighting, hot-water equipment, tubular, panel and radiant heating, and other types of equipment suitable for demonstration purposes. R. DARBYSHIRE, LTD

R. Darbyshire, *Managing Director.*

Blackpool, *January 27th.*



Miss C. Haslett, the director of the Electrical Association for Women, and Miss V. Norvick, the assistant secretary, at the new headquarters of the Association which were opened last Tuesday (See page 153)

Causes of Fire

We beg to bring to your notice an extract from a paper on "Safety of Life from Fire," read by Lt.-Col. Guy Simonds, D.S.O., fire advisor to the Home Office, before the Royal Society of Arts (Journal No. 4183, Volume LXXXI) and think that this merits your serious consideration.

The figures which chiefly concern us are those contained in Appendix 1—"Cause of Fire in Certain Cities." As you will see, these show the number of fires caused by electricity at an apparently high number compared with gas, and while

we do not doubt the accuracy of these figures, we feel that the true position is not indicated by them. We are of the opinion that the relative safety of gas and electricity as lighting and power media would be better demonstrated were these figures given on a percentage basis, *i.e.*, showing the number of outbreaks of fire as a percentage of the number of consumers using the medium concerned. Another important consideration is the seriousness of the fires caused by electricity and gas. It would be interesting to make a comparison of the number of lives lost and the total amount of money involved.

We feel that it would be of interest to have the figures relative to electricity analysed to detail the exact nature of the electrical fault which caused the fire and to indicate if the majority of these outbreaks were due to any particular apparatus or system of wiring. We should also like to know what steps have been or could be taken to reduce this alarming number of fires attributed to electricity.

We would esteem it a favour if you or any of your correspondents could give us any information on the points which we have raised above. LOTHIANS ELECTRIC POWER CO.,
H. C. Babb, *General Manager.*

Musselburgh, *January 24th.*

Radiated and Convected Heat

We have been particularly interested in the remarks of "Indifferent Employé" and Mr. W. B. Parker on the subject of loss of convected heat. The problem is complicated by the great variety in size and shape of fireplace grate openings and surrounds. Before introducing our 3-kW "Screenfire" which, we claim, fulfils all the requirements outlined by Mr. Parker, we endeavoured to classify the standard grate openings, but quite apart from the many old-fashioned types in existence we found it impossible to get anything like standardisation even in the modern patterns.

We can claim, however, that the fire referred to above, which is designed with a highly efficient radiant fire bar, also retains for room-heating purposes the maximum convected heat, with all grate openings up to and including 24 in. in height.

Swansea Works, Birmingham, BULPITT & SONS, LTD.,
January 30th. T. G. Bradley,
Electrical Sales Manager.

Appliances in Bathrooms

I note that another "electrical fatality" is widely reported in to-day's papers. Headlines such as "Killed in her bath with electrical hair dryer switched on" will cause further alarm among users of electrical apparatus.

Until we can get proper earthing arrangements for all portable apparatus likely to be used in bathrooms surely it would be advisable to warn the general public by radio talks and short articles in the daily papers. A list of a few "don'ts," which to those in the electrical industry are quite obvious, would go a long way to preventing accidents and educating the general public.

Even now we see warnings in the papers against looking for a gas leak with a lighted match and leaving the engine running in a closed garage, but never a suggestion that it is dangerous to use unearthed portable electrical apparatus in a bathroom. A.M.I.E.E.

January 29th.

Inadequate Mains: Indifferent Employés

I cannot see that any of your correspondents has advanced a single sound reason why he should not in private encourage the use of electricity as much as possible, or at any rate refuse on all occasions to disparage the cause of electricity. An opportunity to air personal grievances and to make a general grumble against prospects on the supply side has been taken by certain individuals. They should, however, remember that no industry is perfect, and one will find just as many persons discontented with their lot outside the supply industry as within it.

The fact remains also that by adopting an indifferent or obstructive attitude towards electrical progress their chances of prosperity will be reduced. My article referred to the need of support from members of every grade engaged in all sections of the electrical industry: those, for instance, who are employed by electrical contractors, makers of cookers, switchgear, transformers, and other apparatus and machinery. This aspect may be lost sight of as a result of the large amount of correspondence which is mostly irrelevant to the subject matter of the article. R. D. REYNOLDS.

Gloucester, *January 29th.*

Barreters

In his article on this subject Mr. R. L. Spiller states: "In a suitably designed tube the increase in resistance is exactly proportional to the increase in applied voltage"; but this is hardly true.

An increase in voltage increases the current, which increases the temperature, which increases the specific resistance. This makes the increase in current less than proportional to voltage increase, and vice versa. That is the most that can be claimed. G. V. COGHILL.

Ilford, *January 28th.*

Fault Location in A.C. Networks

A simple method

THE accompanying illustrations serve to explain the principle and application of a new method of fault location, described by M. A. Bied in a recent issue of the *Revue Générale de l'Electricité*. In fig. 1, T represents a transformer feeding a three-phase underground cable. In order to locate an earth fault, at say D on phase 2, one of the sound phases is earthed, *e.g.*, phase 3 at M. A circulating current then flows between D and M through the earth (represented by a simple resistance in fig. 1), and if a telephone receiver E be connected to two movable earthing leads P, P¹, a characteristic humming is heard which becomes much louder when the telephone leads approach M and D. This is due to the increased current density in the ground near these points. If the telephone leads be plunged into the earth outside the circuit MD no humming is heard; the sound ceases when the fault is passed because the telephone circuit is then no longer in parallel with the path of the fault current.

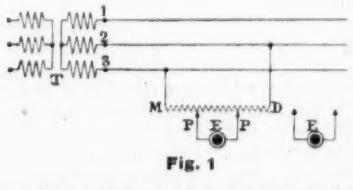


Fig. 1

In practice the procedure is as follows: Having found that the fault is between the two sections boxes, BB, fig. 2, and having identified the sound phases, one of the latter is earthed by a rod M or M_1 connected to the phase selected in a consumer's service box C. Generally, the current flowing in this circuit is from 1 to 5 A; if necessary a resistance may be inserted to limit the current. The searching telephone receiver is connected to two earth spikes about 30 ft. apart, driven into the ground above the cable and moved gradually along it in the direction of the fault. The powerful humming heard in position 1, fig. 2, diminishes in position 2, increases again at 3, and disappears at 4. The position of the fault D can thus be determined quickly and accurately. If the connection M be made, by chance, at or near D, or in case of doubt, repetition of the test from the adjoining section box will confirm the location.

Sometimes, particularly in the case of four-wire, three-phase circuits, a parasitic humming is continually audible; if this confuses the test hum, a commutator connected in the earthing lead M and operated at a musical frequency (say 500 cycles/sec.) produces an unmistakeable note. The use of a commutator in this way also enables the method to be applied to d.c. cables. Several faults in parallel on the same phase, *e.g.*, in successive joint boxes, can be located satisfactorily by means of this arrangement.

If the telephone receiver be used in conjunction with a single-stage low-frequency amplifier and an input transformer, it is sufficient to place one of its earth connections near the earthing spike of the sound phase, using a bare wire as an exploring lead for the other telephone connection. In most cases the simpler equipment meets all requirements.

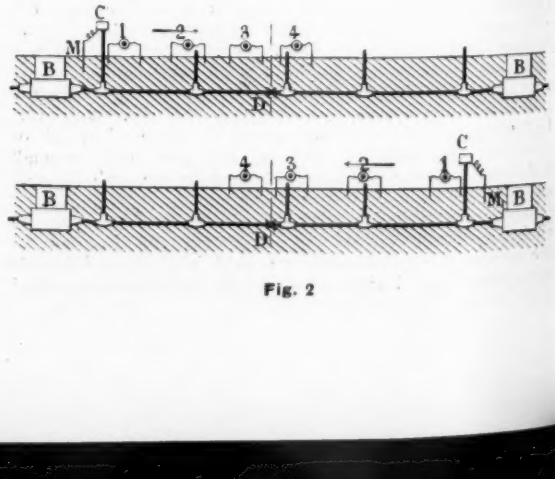


Fig. 2

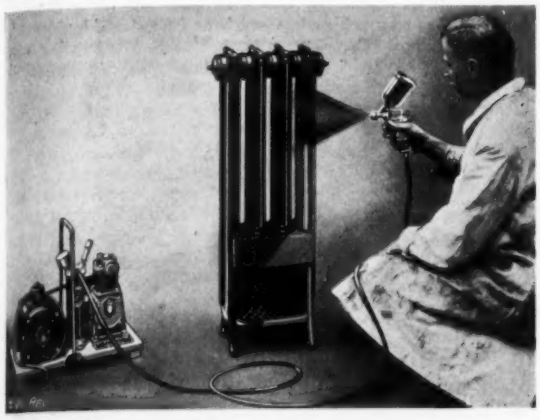
New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

A Portable Paint-spraying Outfit

The "Handi-Spray" is a new introduction by B.E.N. PATENTS, LTD., 92, Tottenham Court Road, W.1, and comprises a single-cylinder air-cooled compressor, a ¼-h.p. motor controlled by a d.p. switch, and an efficient oil and water separator with a pressure gauge and relief valve.

The complete unit is mounted on a light, rigid steel base carried on four rubber buffers, the drive from the motor to



The "Handi-spray" in action

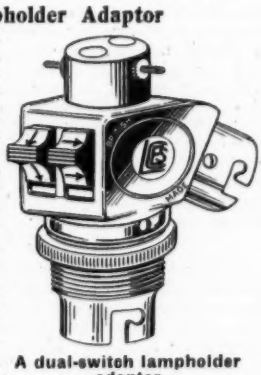
the compressor being taken by an endless silent "V" belt, provision being made for belt tensioning.

The equipment includes a spray-paint gun with container; 25-ft. of $\frac{3}{16}$-in. air hose with connections; 15-ft. of c.t.s. cable, with switch and adaptor, gauge, and relief valve, and the price is £18 10s. to the trade, a universal motor costing £1 5s. extra.

The standard copper container supplied is of the ½-pint size, and the control of the gun is by a light two-finger trigger.

A Two-way Lampholder Adaptor

THE LONDON COMMERCIAL ELECTRIC STORES, LTD., 43, Farringdon Avenue, E.C., has put on the market a British-made two-way lampholder adaptor provided with a switch for each way. The construction is commendable in that it is neat and easy to manipulate, the switches being operated by pushing the "Bakelite" arms about ¼ in. vertically in the slot. This operates a q. m. and b. mechanism inside the "Bakelite" body of the switch, giving a clearance in the "off" position of almost ¼ in. Arrows on the switch arms indicate which holder the switch controls. The price is 3s. 9d.



A dual-switch lampholder adaptor

A Combined Lamp and Reflector

We are informed by the MIRRA LAMP WORKS, 220, Rue de Pont de Malte, Ghent, Belgium, that they are marketing an electric lamp with a silvered neck, thus combining the reflector with the lamp. It is claimed that the silvering will not peel off regardless of the heat of the lamp, although the lamp neck has retained the standard size to enable ordinary reflectors to be fitted.

The Mirra lamp

The "Rosamon" Steriliser

In our issue of August 26th last year (page 289) we described the "Rosoman" steriliser, then a newcomer to the market, made by the WHITE ELECTRICAL INSTRUMENT CO., LTD., 90, Rosoman Street, E.C.1. The name of this instrument has now been changed to "Rosamon," and other developments have taken place.

As the result of continued research and co-operation with a firm of thermostatic metal makers the efficiency of the unit has been increased considerably, in addition to ensuring constancy in the working of the advance cut-out at boiling-point, when 50 per cent. of the heating is cut off by mercury switch tubes. One switch tube controls the remaining 50 per cent. of the heat and rides at an angle of 7 deg. to the horizontal plane, so that, should the chamber run dry, the current is switched off before the bottom reaches 320 deg. F.

Press tools for the full range of sizes have enabled the makers to "mass produce" the bodies, and the new lid, forming a pressed panel, carries a lip to throw the condensation back into the water chamber when the lid opens. An additional new feature is the 10 per cent. increase in the volume of the air lagging. In addition the heads of the tension studs no longer project into the chamber, but are corked into the chamber and left flush with the bottom before being silver soldered. The range covers seven standard sizes from 8 in. to 20 in., with electrical loadings from 700 to 2,500 W; the prices are from £8 2s. 6d. The steriliser is given a three-year guarantee.

A Combined Reading Lamp and Night Light

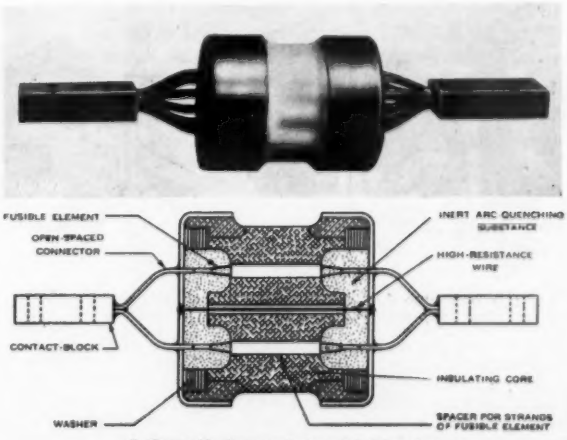
The outstanding feature of the "Wemco" table lamp is the independent night-light incorporated in it. It is made by WALTER'S ELECTRICAL MANUFACTURING CO., LTD., Kensaltown Works, Kensal Road, W.10, and is priced at 32s. without shade. The standard is of oak, 9½ in. high, and is well weighted at the bottom so that it can be tilted to an angle of more than 30 deg. from the vertical without overbalancing. The lampholder is fitted with a push-bar switch and the night-light is situated near the bottom of the column and is worked off a.c. mains through a transformer embodied in the base of the stand. It is controlled by a miniature flush type tumbler switch situated in the box base of the column on the opposite side to the night-light; spare bulbs can be obtained at 1s. each. The cost of running the night-light is negligible as it is rated at only ½ W.

The "Wemco" standard lamp

Heavy-duty Cartridge Fuses

A range of new heavy duty cartridge fuses is being manufactured by MESSRS. A. REYROLLE & CO., LTD., Hebburn-on-Tyne, for a.c. or d.c. up to 700 A at 660 V.

The fusible element consists of strands of pure silver wire, and one strand of relatively high-resistance material. Each strand is threaded through a separate hole in a spacer fitted in the insulating core, so that a number of small explosion-chambers are formed. The ends of the elements are connected to copper tails, and the space in the vicinity of the junctions is filled with an inert arc-quenching substance. Tinned brass end-caps are cemented to the core, and the copper tails extend through the end-caps and are soldered to them. In cartridges for currents over 100 A the tails are also soldered to substantial blocks, by which the cartridges are attached to the contact-blocks in the fuse-handles. For currents up to 100 A the copper



A Reyrolle heavy-duty cartridge fuse

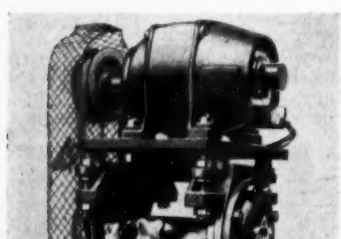
tails are connected direct to the contact-blocks in the fuse-handles.

When carrying current practically up to the fusing-current value, silver wire does not oxidise or deteriorate. A fusing-factor as low as 1.1 can be obtained for most ratings, but ordinarily a factor of about 1.4 is satisfactory. The low fusing-

factor is an additional advantage when fine discrimination is required. A smaller section of silver is required to carry a given current than that of other fusible elements, such as copper, because there is less metal to be volatilised, and hence less vapour to be deionised, and less arc-energy is produced. On the occurrence of a fault, the silver fusible elements melt, but the alternative current-path through the high-resistance wire prevents the application of the restriking transient or recovery voltage to the vaporised silver, and provides a small time-delay during which deionisation of the vapour takes place. The high resistance wire, which is conveniently situated in the centre of the core of the fuse, finally clears the fault.

The " Super Selfix "

The " Selfix " hot water circulator was first put on the market by MESSRS. HOLDEN & BROOKE, LTD., Sirius Works, West Gorton, Manchester, in 1926. The problem of noise has been investigated by the makers, who are now offering a " Super Selfix " unit which possesses all the advantages of the original " Selfix," and is claimed to overcome sound transmission, at the same time embodying other new features.



The " Super Selfix "

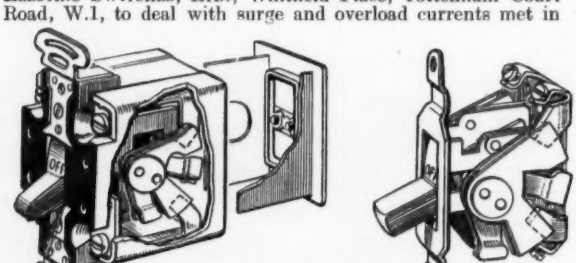
For the damping out and isolation of motor hum special pads are placed under each motor foot and the usual methods of driving the pump have been superseded by a " Si-flex " " V "-belt drive which combines flexibility with silence, the belt itself effecting the isolation of the motor from the circuit. In addition to this it also embodies improvements in the isolating and non-return valve system, in that the unit is hydraulically automatic in service, cutting in and out of operation as the motor is switched on and off; thus when the circulator is running the non-return valve automatically opens and permits an absolutely full-area straight-line flow through the pipe bed, which offers no frictional resistance. This is naturally a valuable feature where gravity circulation is concerned and will be readily appreciated by all heating engineers and consultants.

Complete isolation is obtained in a few seconds without any loss of water from the system, and will allow the pump, if necessary, to be entirely removed while gravity flow continues. Another important feature is that any standard make or type of motor can be fitted, and the use of horizontal motors enables change-overs to be carried out cheaply. The method of mounting the motor above the pump makes the set very compact.

The sale and distribution are in the hands of the NATIONAL RADIATOR COMPANY, LTD., Hull.

Rugged High-capacity Switches

New tumbler switches have been developed by ARROW ELECTRIC SWITCHES, LTD., Whitfield Place, Tottenham Court Road, W.1, to deal with surge and overload currents met in connection with high-wattage gasfilled lamp switching and small motor starting. In shape they resemble the " mortice " switch, a construction which gives them a wide throw. The blades are of a special phosphor-bronze, and they have very large surfaces for the absorption and dissipation of heat. The movement carries two large " Bakelite " " arc snuffers," and as the blades leave the contacts these " snuffers " flash past the ends of the contacts and so cut off the arc practically instantaneously.



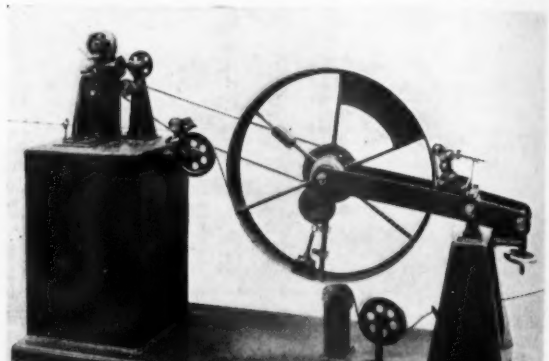
Left: A box type Arrow switch for flush mounting; right: the mechanism showing the " arc snuffers "

There are several designs and sizes, and we would imagine that every industrial need within their capacity limits can be met. A feature is the short square substantial operating handle with " on " and " off " indications at the base. A 10-A 250-V flush-mounting model has a porcelain base and is offered primarily for small motor control in s.p. and d.p. styles fitted in " Bakelite " bases. There is a 20-A 250-V switch, while another model with similar mechanism is available in an attractive cadmium-plated box for surface mounting. In similar design there is a 30-A model for the same pressure, while a t.p. switch is also available in a cadmium-plated box. There are available attractive metal and " Bakelite " plates for flush mounting.

The 10-A switches are being made at Whitfield Place, and arrangements are rapidly nearing completion for the manufacture of the larger models also in this country. In the London factory we saw Arrow domestic apparatus switches, which we have already described, being produced in rotary and tumbler types.

A Length Marking Cable-measuring Machine

A self-contained machine has just been introduced by MESSRS. B. & F. CARTER & CO., LTD., Albion Works, Whitehall Street, Rochdale, which is for marking cable, a mark appearing at every five yards throughout the length of the cable, thus simplifying making pay-out supplies. The machine can also be arranged to mark in feet up to 300 ft. to suit requirements. An instantaneous trip motion releases the guillotine for cutting the cable at any required length, and the guillotine is replaced by treadle motion. The machine is built up on a fabricated steel base plate with standards and pillars of the same metal, electrically welded in position. The all-aluminium measuring wheel, 2¼ yd. in circumference, is suitable for any cable sufficiently flexible to go round it.



The Carter cable-marking machine

The use of this machine helps to reduce the number of short lengths of cable left on any real or drum, and enables the operator to ascertain what length of cable remains. The machine is driven by the cable being drawn through by the customer's coiling machine.

Siemens Dry Batteries

SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38, Upper Thames Street, London, E.C.4, announce that they have arranged to supply replacement batteries for several standard radio receivers. No. 1154, listed at 25s., with terminals at 67½ and 126 V. is available for the " Philco " superheterodyne; No. 1136, a 108-V model at 10s. is suitable for " Marconiphone " portables Nos. 53 and 55; No. 1153, combining a 114-V battery with a 6-V grid bias, and costing 11s., is suitable for " Marconiphone " receivers Nos. 248 and 255, and Cossor Model 322. For the Philips 330 B receiver battery No. 1158 has been introduced and is priced at 15s. The trade name is " Full-o'-Power."

A " Stop " Light

Much as " stop " lights are to be commended on vehicles, many types have one great disadvantage; that is, that the light glows when the brakes are applied regardless of whether the retardation is great or not. In fact when descending a steep hill the " stop " light may glow when the car is actually accelerating; worse still, the reverse may happen when the car is ascending a hill. To cure this defect MESSRS. R. CADISCH & SONS, 506, Red Lion Square, W.C.1, have brought out a combined rear and " stop " light fitting which is a self-contained unit controlled by a swinging horizontal inertia member and unconnected with the brakes in any way. Any retardation of the car by either braking or deceleration brings the " stop " light into action immediately, and reversing has the same effect. Illumination during the day is by means of a pivoted reflecting mirror and at night from the rear light lamp through a moving shutter. In fixing, the old rear light is removed, a single hole is drilled, the fitting is bolted into place and the wiring from the old rear light is connected up. The price is 18s. 6d., and the trade name is " Taplin."

The " Taplin " " stop " light

The Grid Scheme—and After. By Brig.-Gen. R. F. Legge, C.B.E.

The urgent need for a national sales and publicity plan

THE grid scheme is nearing completion. Its chief asset is that it assures an ample and efficient *production* of electricity. Now on the one hand there is a public anxious to learn if the "cheap and abundant" supply they have heard so much about is likely to materialise in the near future or if they have still to "wait and see," and on the other hand are those responsible for the scheme "thinking furiously," at this eleventh hour, as to how an adequate market can be created for the energy accruing from the scheme which they have so efficiently planned and so rapidly brought into being.

A common-sense point of view indicates that, if the development of the potential electrical field is to be achieved to the extent necessary for the success of the scheme, some definite national sales and publicity policy must be put into vigorous operation at once. Such a course is essential to stimulate the easy-going undertakings to bestir themselves. Although the advent of some such policy is a certainty, the actual form it will take is a matter of conjecture, and the question is therefore who is going to take action and what action is going to be taken.

The generation of electricity has been co-ordinated and placed under the control of one central body. The natural corollary is that this should find its counterpart not only in co-ordination of distribution but also in an immediate and adequate "forced" development of sales enterprise in all unprogressive supply undertakings such as will ensure the provision by them of suitable networks, modern sales facilities, sound publicity and comprehensive tariffs. One thing quite certain is that, having expended so much money, the country cannot afford to "wait and see." Whether the powers that the authorities now possess under the 1926 Act are sufficient to cope with the situation, or whether the seeking of additional powers is contemplated, has not yet been divulged, but it would not be surprising to hear of some pronouncement on this point in the near future.

Should the Small Undertakings be Superseded?

It is easy to guess that the authorities have been overwhelmed with schemes from all and sundry, suggesting what to do and how to do it; but unfortunately few can claim experience in handling similar situations. One or two company undertakings giving bulk supplies to a number of local authorities, and therefore occupying, though in a lesser degree, a position analogous to that of the Central Board, may have gained useful knowledge, based on their experience, which might be utilised with advantage. Perhaps it would solve the question if the larger and more efficient undertakings, selected stations and others, were given powers to take over control of distribution from the smaller authorities who are receiving bulk supplies directly from them and indirectly from the Board.

Some time ago there appeared a more than usually vigorous newspaper "stunt" concerning electricity. This, combined with certain misleading statements made by people with more enthusiasm than discretion, resulted in that large section of the public which culls its ideas from its morning paper forming the opinion that the grid scheme in operation meant all domestic electricity at a penny a unit at once and, further, that a "pylon" in the ploughed field indicated an immediate supply in the farmhouse parlour adjoining. These impressions are still retained in the minds of many who are paying more than a penny for their unit of electricity or who have transmission lines erected on or near their properties.

What is the best course to pursue to remove such erroneous and harmful conceptions? One way is to institute a newspaper education, supported by a poster campaign, carried on over a long period and framed in such a manner that he who runs may read. This might be conducted in parallel with a much-needed education in the general use of electricity, and the foundation so laid cemented by a sales advisory scheme having for its subject the commercial energising of those undertakings upon whose intensive, immediate development the success of the grid scheme so largely depends. By this means the public would learn, *inter alia*, what to expect from their local electrical undertakings, a matter about which at present they know very little or nothing, and further would realise that the extensive use of domestic apparatus is one of the best methods to bring about a rapid reduction of the unit price.

Large Expenditure Necessary

The foregoing resolves itself into a suggestion that a scheme embracing (a) national publicity, and (b) commercial energising should be organised under the auspices of the Central Electricity Board. Regarding the former, the electrical industry would do well to remember that the British Commercial Gas Association spent over £41,000 during the year ended July 31st, 1932, on Press advertising alone and, in addition, a considerable sum on posters supporting this campaign. An effective Press advertising scheme, embracing national daily and Sunday newspapers as well as a number of provincials and certain periodicals, could not be adequately carried out under £7,000 or £8,000 per month. A supporting poster campaign of the necessary magnitude would cost probably an additional £25,000 in a year.

It might be argued that, if the British Commercial Gas Association needs to spend only about £40,000 a year in the Press, this sum should be adequate for electrical publicity. It must be borne in mind, however, that the gas organisation has been spending large sums of money regularly for a number of years, and each advertisement now appearing reaps the benefit of those which have appeared so many times before. On the other hand, advertising for the Central Electricity Board would commence without even a running start, and although it would possess immediate news interest the effect of such advertising would not be felt or a harvest reaped from it for some considerable time. It is therefore essential to put as much weight behind it in the form of large spaces and frequent insertions in as many papers as possible. The results of such advertising will also be shown in more news articles and paragraphs in the editorial columns of the papers.

[*Lafayette*

Brig.-Gen. Legge is general manager of the British Power & Light Corporation (1929), Ltd.

It is a well-known fact that during the Illuminating Engineering Convention of 1931 the editorial facilities offered the Press were inadequate. The result of this was that the Press—which would have been only too willing to co-operate to the fullest extent—got tired of being pushed from pillar to post—from one publicity organisation to another—and the resultant editorial attention obtained was but a fraction of the possible maximum.

On the other hand, the executive work of the Press and poster campaign, and the important addition of supplying undertakings with direct mail literature, could be carried out best by reputable advertising agencies in tune with modern trends. It is essential that the most important item—paid publicity in the Press—should suggest the modernness of electricity and be told by the very best methods of emotional and other appeals which first-class agencies are so well equipped to provide. Such agencies, of course, should work under the control of the Central Board.

A Sales Development Association Needed

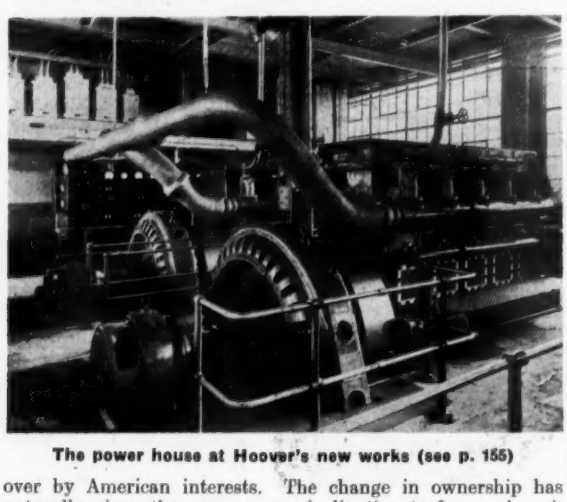
With regard to the second portion of the scheme, "commercial energising": if the idea of the efficient large undertakings controlling the distribution of the smaller and less efficient is not adopted then a sales advisory organisation might be formed within the Central Electricity Board possessing the necessary powers to make it effective, which could be obtained by legislation. (It might be advisable to form such a body in any circumstances.) Small but under able and energetic leadership, this department could soon tactfully persuade backward undertakings to embark upon a progressive sales policy. This should include the engaging of adequate sales staff, the opening of showrooms, the introduction of hire and hire-purchase schemes, and the utilisation of local publicity. In short, such a department would act for the industry as a sales development association—an essential corollary to any publicity organisation.

Concentration on the development of the domestic field has saved more than one undertaking during the industrial depression. Such a policy is equally important to the grid scheme. What is necessary is to double, in the near future, the 3,000 million kWh sold in a year for lighting and domestic supplies; this can be done and at a vastly quicker rate than the present increase of 300-400 million kWh per annum. The industry has looked to the Central Electricity Board to produce the goods, the Board now looks to the industry to market them. The time is short and the need is urgent.

Electrical Supplies for Chile

A RECENT report on the Chilean market for domestic electrical appliance trade in Chile (prepared for the Department of Overseas Trade by the Commercial Secretary to H.M. Embassy, Santiago) states that in recent years there has been an extension of the consumption of electricity, and a corresponding increase in the demand for electrical equipment which local manufacture has so far made scarcely any attempt to meet. The system of supply is generally either 220/380 V a.c. or 220/440 V d.c., with a strong tendency for the latter to be replaced by the former, particularly in the central provinces. Approximately 77 per cent. of the total output is provided by the Compania Chilena de Electricidad, simply because this concern supplies the two most densely populated provinces, which include Santiago and Valparaiso; these two towns probably absorb over 50 per cent. of the total sales of electrical equipment.

The Cia. Chilena de Electricidad was under British control in the years following the war until 1929, when it was taken



The power house at Hoover's new works (see p. 155)

over by American interests. The change in ownership has naturally given the company an inclination to favour American products under equal conditions, although it is understood that the general policy is to buy the cheapest product provided the quality is suitable. Unfortunately, up to the present the United Kingdom article, on account of its relatively high price, has not been able to take advantage of this attitude. The policy of the company in developing a retail business in domestic electrical appliances, and in encouraging their use, has been an important factor in extending the market for them. To increase the consumption of electricity, domestic electrical appliances have been sold at relatively low prices by the company.

Until recently there was no tendency on the part of the Chilean people to move from large houses into smaller quarters and to substitute labour-saving devices for servants. With the advent of the world-wide economic depression, however, diminishing incomes have set up a movement into flats and smaller houses, resulting in an increasing demand for labour-saving devices. But at present this development of the market has been checked by the cessation of imports and rapidly rising prices. The competition of gas has been gradually overcome by a progressive reduction in recent years of the charges for electricity. Many electrical appliances, such as laundry and cooking apparatus, are still in the novelty stage. Radiators and irons are, however, being regarded as necessities by an increasing number of people.

British Appliances Rarely Seen

Although there is no complaint as to the quality of United Kingdom products, the price is too high to compete successfully with American and German goods, and for practical purposes no domestic electrical appliances of United Kingdom manufacture are being marketed in Santiago at present, and the question of United Kingdom manufacturers eventually obtaining a share in the existing trade is an extremely problematical one, dependent first on price and secondly on the appointment of suitable agents possessing an adequate supply of spare parts and capable of giving service. Prices are kept low by the policy of the Chilean Electricity Co., which has the preponderant share of the trade. Its commercial department, provided that it does not actually operate at a loss, aims at selling the largest possible volume of electrical apparatus at very attractive prices, and, before the present restriction of credit, used to offer specially advantageous terms of payment. The company's buying organisation is centred in New York, in the Phœnix Utility Company, which is in a position to buy at one time for the Electric Bond and Share Company's many subsidiaries all over the world, with a conspicuous resultant saving in initial costs. The company is ordinarily content to make a small profit on the appliances sold, a profit that would represent unwarrantable sacrifice for the ordinary retailer with no power resources. It spends a huge sum on newspaper advertising, and indulges almost continuously in sales campaigns, when apparatus is sold at bargain prices and free gifts are the rule.

The company not only provides free installation of apparatus purchased, but maintains a demonstrator who, in the case of a cooker, for instance, gives instruction on its use in the purchaser's home. It has already opened in Chile ten centres for the retail sale of electrical apparatus, and the branches tend to multiply; other Valparaiso firms still trading in electrical appliances can only hope to compete where it is not represented.

Instalments are characteristic of the trade in electrical appliances, and instalments mean in this case monthly collections, which in turn are facilitated by the machinery already in existence for collecting electricity accounts.

What British Manufacturers Must Do

It appears necessary, therefore, that if United Kingdom manufacturers wish to introduce their products into Chile they must communicate with the company, quoting prices c.i.f. Valparaiso. It would be impossible for any firm to sell its goods retail in face of the electricity company's competition. If the commercial department of the Chilean Electrity Company shows a definite interest in the offers of any United Kingdom firm, this firm should appoint a resident agent in Santiago, who should be well supplied with spares so that he could be in a position to give adequate service. It must be emphasised, however, that there is little hope of marketing United Kingdom domestic electrical appliances in Santiago unless their price compares favourably with those of United States and German products.

It has been said that the electricity company buys instinctively from the United States, but even so, since Chile is its field and Chile is a price market, it has to consider cost, and for this reason it has already chosen a Norwegian cooker and iron for general use. It happens that the firm favoured is a foreign subsidiary of an American factory, but it proves also that there is no bias against Europe, if Europe can provide the economical yet serviceable article that sells. Therefore, United Kingdom manufacturers who feel that they really have something competitive to offer cannot do better than approach the Compania Chilena de Electricidad, Ltda., Casilla 12-V, Valparaiso, direct, or, preferably, through the buying organisation, the Phœnix Utility Company of New York. Unfortunately, the present monetary crisis in Chile has given rise to a great scarcity of foreign exchange, hence it is not desirable to sell to Chile except on the basis of cash in sterling before shipment.

Import Duties

An appendix to the report gives the following details of import duties applying to domestic electrical apparatus.

Domestic heating appliances of various kinds are dutiable under section No. 1270 of the Customs Tariff:

Stoves, cookers, ranges, heaters, kettles, ovens, boilers, fireplaces (braseras) and other similar apparatus, fitted with burners: for domestic use, consuming electric current. Per kilog. (gross wt.) 1 peso.

If nickel-plated, a surcharge of 50 per cent. is imposed.

In addition to duty the following taxes are payable:

(1) Statistical fee of 3½ per cent. *ad val.* This is in place of the consular fee of the same amount which was formerly charged.

(2) Surtax of 10 centavos per 100 kilogs. (gross wt.).

Import duties are payable as to 10 per cent. in foreign drafts, the balance being payable in Chilean currency with surcharge proportionate to the exchange depreciation of the Chilean peso, of which the par value is 6d. or 0.12 dollar (U.S.). The amount of the surcharge is fixed weekly according to the percentage depreciation of the peso in terms of the U.S. dollar.

Domestic Electrical Development in Canada

Owing to the low cost of electricity in Canada, states a *Reuter's Trade Service* message from Montreal, electricity continues to play a more and more important part in the industrial, commercial, and home life of the people. While industry during the past year has been more or less marking time, the use of electrical appliances in the home, such as ranges, radio sets, refrigerators, irons, water-heaters, &c., has rapidly increased. The number of homes wired for electricity is 1,500,209 compared with 1,484,209 at the beginning of 1932. At the end of 1932 there were 286,599 electric cookers in use, or 15,000 more than at the beginning of the year; 426,927 electric washing machines (30,000 increase); 122,342 refrigerators; and 115,800 electric water-heaters.

In the Courts

IN the Chancery Division on January 24th, Mr. Justice Clauson had before him an action brought by the Marconi International Marine Communication Co., Ltd., against Mr. H. Thorpe Woods, Monkseaton, Northumberland, for an injunction and ancillary relief to restrain the defendant from committing a breach of an agreement, dated February 25th, 1931, and March 10th, 1931, that he for a period of three years from February 25th, 1931, would not carry on or be engaged in the business of marine wireless apparatus similar to that carried on by the plaintiffs or repeating the acts complained of. The plaintiff company also claimed damages.

The plaintiffs' case was that from April 1st, 1929, the defendant was employed by them, his engagement being terminable by one month's notice on either side, and that on February 25th, 1931, he agreed to terminate his employment upon the receipt of six months' salary. On or about March 10th, 1931, in pursuance of the agreement, the defendant in consideration of the payment to him by the plaintiffs of £246 14s. 9d., for a period of three years agreed not to carry on or be engaged in any business similar to that carried on by the plaintiffs.

The plaintiffs alleged that in November, 1931, the defendant became engaged in the business of marine wireless apparatus, and had entered into the service of the International Marine Radio Co.

The defendant pleaded that the agreement went further than was necessary in protecting the plaintiffs in their business, and was contrary to public policy, and that he ought to be relieved from it.

Evidence having been given on behalf of the plaintiffs as to the agreement on which they sued, and defendant having given evidence, Mr. Norman Danes, K.C., for the defendant, submitted that the agreement was an unreasonable one, and went further than was necessary for the protection of the plaintiffs' trade or business, and therefore should be held to be one in restraint to trade and unenforceable as being against public policy. The defendant had offered to return to the plaintiffs £123 which he had received from them over and above the six months' salary which had been paid to him.

His Lordship in giving judgment, said he did not believe that the interests of the public were affected in any shape or form in the matter. Although somewhat wide in its terms, he thought that the agreement was a reasonable one. He accordingly granted the plaintiffs an injunction, with the costs of the action.

In reply to his Lordship, Mr. Swords, K.C., for the plaintiffs, said that his clients asked for damages, but he did not know whether in the circumstances an inquiry as to damages would be proceeded with. His Lordship said he would say nothing about damages.

Australian Currency or Sterling Dividends?

In the Chancery Division last week Mr. Justice Farwell reserved judgment in the case of the Prudential Assurance Co., Ltd., against the Adelaide Electric Supply Co., Ltd. This was an action by the plaintiff company, as the holders of £11.000 5 per cent. "A" cumulative preference stock, and £30,000 6½ per cent. "C" cumulative preference stock of the defendant company on behalf of themselves and all other holders in the English register of the defendant company of those stocks, for a declaration that they were entitled to be paid their dividends and not in the equivalent of Australian currency.

A Patent Dispute

Mr. Justice Luxmoore in the Chancery Division on January 27th heard a motion in the action of Violite, Ltd., against A. E. Chapman & Low Tension Luminous Tubes, Ltd., for an order that the defendant, Mr. Chapman, the former technical manager of the plaintiff company, should be directed to lodge complete specifications of certain inventions for which he had applied for provisional protection while in the plaintiffs' employment. The plaintiffs alleged that it was a term of Mr. Chapman's employment that they were entitled to the benefit of any inventions or improvements made by him while in their employment.

Mr. K. E. Shelley, for the plaintiffs, said that since the motion was launched Mr. Chapman had lodged complete specifications in respect of three of the applications, but in respect of two of them had declined to complete as he had been advised by his patent agents that the inventions which were the subject of the applications had been in use by other persons at the date of the applications.

Having heard Mr. Beyfus, for the defendant, Mr. Chapman, on his Lordship's suggestion, agreed to lodge complete specifications in respect of the uncompleted applications without prejudice to his right to request the Comptroller to withhold acceptance until after the action was determined. The plaintiffs agreed to indemnify Mr. Chapman in respect of the patent, office fees and agents' charges in respect of the completion of the applications if Mr. Chapman requested them to do so, the costs being made costs in the action.

Mr. Beyfus said that Mr. Chapman had agreed to assign one of the patents to the defendant company.

More Electricity for Irish Hospitals

IT would be splendid if once at least in a half century every comfortably established public service were turned inside out and well shaken. Something of the sort is taking place in the Irish Free State as a direct outcome of the colossal sums made available for the public hospitals by the sweepstakes.

The committee of three which was appointed under the Irish Sweepstakes Act regulating the distribution amongst the voluntary hospitals of a certain percentage of the proceeds from the sweepstakes has already issued two searchingly critical and exceedingly valuable reports, which have caused a great stir in medical circles, and amongst the Boards of the participating hospitals.

The Committee, having studied the most modern hospital practice in Great Britain, on the Continent and in the United States, has not overlooked the part to be played by electricity. It says: "Electricity possesses special advantages not only for lighting, but for certain other purposes, and the possibilities of its use for various hospital services should be carefully explored, with due regard to economy, and after full consideration not only of the comparative costs, but of the advantages and disadvantages of alternative sources of heat and energy." That this recommendation is likely to bring in a good harvest for the electrical trades can be seen from that portion of the report dealing with the National Maternity Hospital, Holles Street. This very old Dublin hospital is being rebuilt upon a much larger scale, and is one of the first of the hospitals for which most of the figures of cost have been based on actual tenders. It is commonly believed, and has been so stated in the Press, that this is to be an all-electric hospital, so the following items of cost abstracted from the detailed award ought to include a goodly proportion for electrical materials and wages:—Heating and plumbing, £15,610; special ventilation of theatres, £1,000; electric wiring, £2,310; luminous indicators, £300; internal telephone system, £394; stand-by electrical plant, £336; special electric mains, £247; sterilisers and piping, £3,740; laundry equipment, £2,300; refrigerators, £680; kitchen equipment, £1,303; conveyors, bed, service, and pavement lifts, £1,930; a total of £30,150. There is also an amount of £4,737 awarded for medical, surgical, and pathological apparatus, including an X-ray installation which will cost £1,500.

Expert advice having been obtained the hospital board decided to heat the entire building on the ceiling panel system, the water being heated electrically on the thermal-storage system, all hot water supplies being similarly treated, and all steam generated by electricity. The Electricity Supply Board has guaranteed that the annual expenditure on hot water and steam supplies shall not exceed £2,500.

It is permissible to assume that 10 per cent. of the total building costs will be spent on electrical work, in which case about £300,000 may be expected from the forty-eight hospitals which are the subject of the Committee's reports, and some more from the local government institutions.

A Large Arc-welded Penstock

BY making available manual and automatic arc welding processes, both utilising a completely shielded arc, the Lincoln Electric Co., of Cleveland, Ohio, and London, is assisting to improve welding for the fabricators of metal structures. Due to the use of a shielded arc, welds can now be made having a tensile strength exceeding that of mild rolled steel and of 20 to 50 per cent. greater than the strength of welds made with an unshielded arc. An interesting and unusual example of arc welding is shown in the illustrations on page 177. Lying on a grade of almost 50 per cent., a 7 ft. diameter steel pipe, claimed to be the first penstock to be constructed by this method, was successfully welded by the shielded arc process without one leak being discernible under pressure tests. The left-hand picture shows the work in progress.

This penstock is situated at the San Francisquito power plant (No. 2), a unit of the Los Angeles Bureau of Power and Light hydro-electric system.

The right-hand picture shows one section of the 1,400 ft. long penstock, the smooth surface of the steel being very conspicuous. One of the reasons arc welded construction was decided upon was because of the increased efficiency of the steel pipe made possible by the elimination of rivet heads and butt straps. The substitution of arc welded joints reduced friction losses and provided a permanently leakproof pipe line.

A. J. T. EYLES.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

The British Industries Fair

The programme of visits by electrical associations to the Birmingham Section of the Fair has now been completed. The arrangements are as follows:—

Tuesday, February 21st.—Tea: The Electrical Association for Women.

Wednesday, February 22nd.—Lunch: The Institution of Electrical Engineers (South Midland Centre), Incorporated Municipal Electrical Association (Midland Area), Electrical Wholesalers' Federation, Association of Supervising Electrical Engineers, Electrical Contractors' Association, Electrical Contractors' Association of Scotland, Illuminating Engineering Society, Tramways, Light Railways and Transport Association.

Thursday, February 23rd.—Tea: Electrical Association for Women.

Friday, February 24th.—Lunch: The Association of Mining Electrical Engineers.

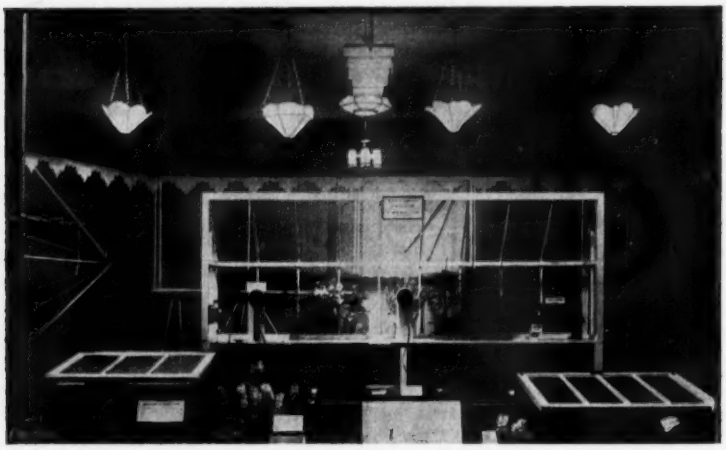
Saturday, February 25th.—Lunch: The Electrical Power Engineers' Association. Tea: The Institution of Electrical Engineers (South Midland Students' Section).

Wednesday, March 1st.—Lunch: The Institution of Electrical Engineers (Council), Incorporated Municipal Electrical Association (Council), British Electrical Development Association, Incorporated Association of Electric Power Companies, Provincial Electric Supply Association, Association of Consulting Engineers, London Electricity Supply Association, British Electrical and Allied Manufacturers' Association (Council).

The annual dinner of the South Midland Area of the British Electrical Development Association will be held at the Queen's Hotel, Birmingham, on the evening of Wednesday, March 1st.

The Batti-Wallahs' Luncheon

The principal guest at the monthly luncheon of the Batti-Wallahs' Society, held at the Hotel Metropole on January 26th, was Sir Louis Stuart, C.I.E., who chose as his subject "The Indian Empire." Sir Louis, who was for forty years in the Indian Civil Service, displayed a wide knowledge of the problems confronting the Government in India, and of the attitude of certain sections in India against British rule. He expressed the opinion that, if the Congress party obtained power, the result would be ruinous to British industry in India, as British goods would be barred from India altogether. Already with the raising of import duties, the quantity of goods imported showed a decrease. The Congress party was only a small political section demanding certain things in its own interests. Col. R. E. Crompton thanked Sir Louis for his address.



An electrocultural display for gardeners at Ilford

Electrical Dock Equipment

The new graving dock at the Scotstoun works of Barclay, Curle & Co., Ltd., which has cost £500,000, was recently opened. The firm already has extensive establishments and facilities for ship repairing on the Clyde, but the construction of the new dock will enable them to deal with about one million tons of ship repairing annually. To permit of the transport of heavy machinery, &c., the area surrounding the dock will be equipped with pneumatic pipe lines and electric and hydraulic gear for the expeditious manipulation of the machinery and materials employed in ship repairing. The equipment also includes travelling cranes and heavy derrick cranes. The pumping arrangements will be served by the latest type of centrifugal pumps which are capable of emptying the dock in a comparatively short time. An interesting feature of the new dock is the "Box" type gate at the entrance to the basin. When a vessel is to be docked, the gate is lowered through the water into a flat position, and the steamer passes over it into the dock. Thereafter the gate is lifted up by means of wire ropes into the closed position. The gate was constructed by Sir William Arrol & Co., Ltd. The 25-ton crane at the dockside and the electric capstans were also the work of Sir William Arrol & Co.

The Australian Association of British Manufacturers

The annual meeting of this Association was held at Australia House on January 24th, when Mr. A. Comrie Cowan presided in the unavoidable absence of Sir Arthur Balfour. The annual report which was presented showed that the Association has been very active during the past year in matters affecting Anglo-Australian trade, particularly tariffs. It tendered evidence at a number of tariff inquiries, including one dealing with the duties on electric motors (at which a reduction was secured) and another on electric fans at which an application for increased duties was opposed. Sir Arthur Balfour has consented to continue to act as chairman for a further period. The meeting was addressed by the Rt. Hon. S. M. Bruce, C.H., P.C., the Australian Minister in London.

Wages in the Cable-making Industry

The Joint Industrial Council for the Electrical Cable-making Industry informs us that there will be no cost-of-living alteration in wages in the industry on the third pay-day in February.

New Zealand Customs Decision

By a recent decision of the New Zealand Customs Department with regard to the classification of various articles under the Customs tariff, the general duty on insulators and fittings therefor has been fixed at 25 per cent. *ad valorem*. Under the British preferential tariff these goods are admitted free of duty.

An Electrocultural Window Display

The accompanying illustration shows a display which was recently arranged by Messrs. H. Church & Co. (Essex), Ltd., in the window of the Ilford Corporation Electricity Department's showroom. The object of the display was to show the public the possibilities of electricity in the garden, and was chiefly for the interest of amateur gardeners, although a diagram was exhibited indicating the possibilities of electric heating from the professional gardener's point of view. The apparatus displayed included a section of a greenhouse in which was installed an electric water heater, complete with thermostat, an electric propagating and forcing frame, an air heater for very small greenhouses, and an ordinary garden frame with an automatic electric heater as protection against frost, also with thermostatic control.

The Dutch Radio and Lamp Trade

Dutch exports of wireless apparatus and electric lamps last year showed a marked decline as compared with 1931 and 1930. The fall in the value of the former is attributable partly to lower prices and partly to the fact that the Philips concern has found it expedient to serve its overseas customers to an increasing extent by establishing branch factories abroad. The total value of the exports of radio apparatus from Holland last year was 38,436,000 fl. as compared with 48,559,000 fl. in 1931 and 66,328,000 fl. in 1930 (at par the florin equals about 1s. 8d.). It is noteworthy that in May a recovery in this trade set in and continued steadily right up to the end of the year. In December, in fact, exports showed an increase in value compared with the corresponding month of 1931. Foreign sales of lamps last year fell to 7,476,000 fl. as compared with 13,302,000 fl. in 1931 and 22,922,000 fl. in 1930.

Bermuda Tariff Modifications

A revised Customs tariff has been introduced in Bermuda, which remains in force during the current year. This affects electrical appliances, apparatus, lamps and fittings; the duty on foreign goods of these classes has been increased to 25 per cent. *ad valorem*. The duty on electric generating machinery has been increased to 20 per cent. *ad valorem*. In both instances the British tariff remains unchanged at 10 per cent. *ad valorem*.

The E.D.A. Public Speaking Competition

The winners of the eight eliminating "public speaking" competitions in the London and South-East England Area held from January 23rd to 27th were the following:—Mr. E. G. Rutter (Brompton & Kensington Electric Supply Co., Ltd.), "What the Grid System means to the Public"; Mr. T. H. Jones (General Electric Co., Ltd.), "Electric Farming"; Mr.

C. H. Brown (Brompton & Kensington Electric Supply Co., Ltd.), "The Contribution of Electricity to Human Welfare"; Mr. G. V. Gay (County of London Electric Supply Co., Ltd.), "The Relations between Electric Supply Undertakings and their Consumers"; Mr. E. J. A. Leroy (Brompton & Kensington Electric Supply Co., Ltd.), "The Everyday Use of Electricity"; Mr. R. K. Anson (General Electric Co., Ltd.), "Art and Electric Lighting"; Mr. W. C. Huston (British Thomson-Houston Co., Ltd.), "The Electricity (Supply) Act, 1926"; and Mr. C. F. Mayson (General Electric Co., Ltd.), "Electricity as a Heating Agent."

These competitors qualified for the area final which was to be held at E.D.A. offices on Wednesday last, when they were to be judged by Sir James Hawkey, J.P., Mr. F. Webster, and Mr. G. S. Francis. The women's competition will take place at the E.D.A. Offices on February 3rd at 7 p.m., when the judges will be Catherine Countess of Westmorland, Mrs. A. C. Cramb, and Mr. G. S. Francis. In view of the great interest which the eliminating competitions have already raised it is hoped that good audiences will be obtained for these final competitions, and everyone in the industry is invited to attend.

Trade Announcements

Messrs. Westbury & Griffiths, 78-80, Lombard Street, Birmingham, have taken over the electrical fittings business of Messrs. Phillips & Turner.

Mr. C. W. Strutt has taken over the electrical accessory and radio business of Mr. H. J. Creffield, 90, High Street, Erith.

Messrs. Baxter & Caunter, Ltd., have been appointed sole agents by the Manor Electric Oven & Fire Co., in London and the Southern and Eastern Counties, for the sale of its cookers, pastry ovens, hot cupboards, carving tables, fish fryers, and enamelling ovens.

"Ramie Normal" and "Midget" porcelain connectors for house-wiring joints are to be made in this country by the V. G. Manufacturing Co., Ltd., Gorst Road, Park Royal, N.10, which has erected a factory for the purpose.

On February 13th the London office of the Beetle Products Co., Ltd., and the Streetly Manufacturing Co., Ltd., will be moved from 49, Wellington Street, W.C.2, to 1, Argyll Street, W.1.

Recent Contract

The Derby Corporation has placed a repeat order with Guy Motors for twelve more electric trolley buses. The chassis will be equipped with the Guy patented 75-h.p. compound-wound regenerative motor. The loaded weight of these buses is thirteen tons and, like the twenty previously placed in service, they will be fitted with the Westinghouse air brake.

The Marking of Imported Valves

The Board of Trade gives notice that it has referred to its Standing Committee an application for an Order-in-Council to require the marking with an indication of origin of imported wireless valves and rectifying valves. Representatives of any interests substantially affected by the application who desire to be heard in opposition at the public inquiry which will be held later by the committee should communicate with the secretary, Mr. E. W. Reardon, Board of Trade Offices, Great George Street, S.W.1, as early as possible, and in any case not later than February 25th, 1933.

An American View of Opportunities

In view of the correspondence on the subject which has recently appeared in this journal, it is most interesting to find that the problem of the future which young electrical engineers are now facing is engaging the attention of men in the United States too. Here is a passage from an address by Mr. J. S. Tritle, president of the National Electric Manufacturers' Association, reprinted in the Association's December *Survey*:—

With our vast amount of unemployment and the lack of jobs enough to go around, I am often asked "What about the young men who are being graduated from our colleges during these years? What's to become of them?" Well, I am more than usually sympathetic with these young men because I well remember when I came out of school back in 1893. We were in a panic somewhat similar to the situation that now prevails, but somehow I and every other young man who came out of school at the same time got along somehow for, after all, a period of depression is the young man's opportunity. His success will depend pretty much upon his attitude of mind. If he steps into the business world with the attitude of looking for a position instead of hunting a job, he will probably run into considerable difficulty. But if he has the attitude of mind to be of service, to give more than he is paid for, whatever ability he has will eventually be recognised and he will have the advantage of riding with business on its up-curve. The young man should realise that every man at the head of industry or business is growing older every day. A few years from now the young men of to-day will be running the industries of this country, so they should be every day improving themselves so that, when opportunity offers, they will be in a position to take on more important jobs. I can tell you that even to-day, after three years of intensive weeding-out process, one of the most difficult jobs I have is to find the right younger man to put in charge of an important activity that has been vacated by an older man in his advancement. I continually stress the fact in my own company that men in authority have no greater single responsibility than that of developing younger men to eventually take over their duties.

A Machine Tool Demonstration

At their Sheffield showrooms (Ellin Street) Messrs. Alfred Herbert, Ltd., have arranged a display of their machine tools, small tools, fine measuring instruments, &c., to which manufacturers and members of their production staffs are invited. The exhibition remains open until February 6th. Among the equipment displayed are several examples of machine tools with built-in electric motors, a development to which the company is now paying a good deal of attention. A view of the show is reproduced herewith.

Messrs. Herbert's machine tool exhibits

Exhibition at Lockerbie

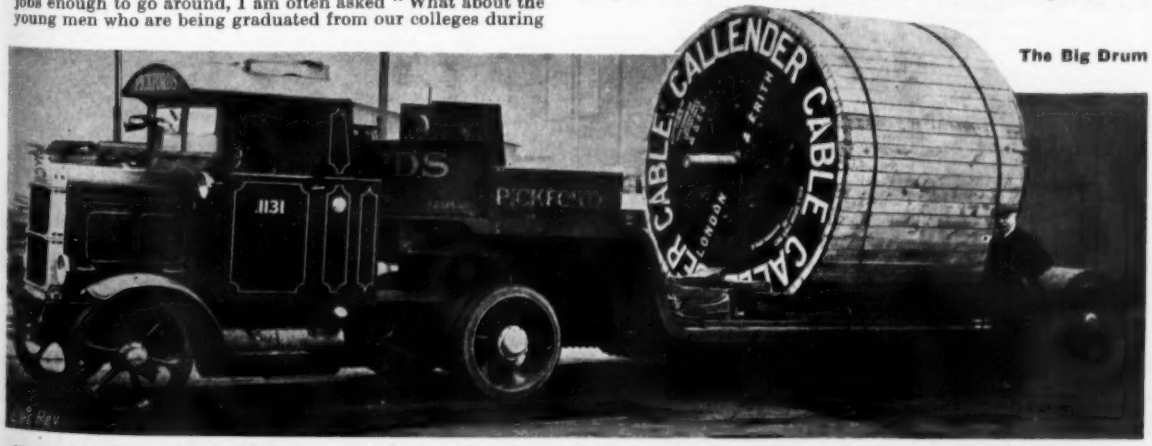
An exhibition is being arranged at Lockerbie Town Hall on February 4th in connection with the inauguration of supply at Lockerbie and Annan.

Change of Address

The National "Safety First" Association has removed to Terminal House, 52, Grosvenor Gardens, S.W. (telephone Nos.: Sloane 2188-9).

The P.M.G. at the Standard Works

Sir Kingsley Wood, the Postmaster-General, paid a visit of inspection to the Hendon works of Standard Telephones and



The Big Drum

This consignment of Callender three-core paper insulated cable for Messrs. Balfour & Beatty (Dornoch Firth crossing) weighs 25 tons; the drum is 9 ft. 6 in. in diameter. The progress of the Dornoch scheme is referred to on page 170

Cables, Ltd., on January 25th. Accompanied by Mr. E. S. Byng (managing director), Mr. T. C. Spencer (general manager), and Mr. G. Hurford (Hendon manager), Sir Kingsley made an extensive tour of the works where a wide range of telephone, telegraph and radio equipment, including several large orders for export, was seen in course of manufacture. Among these were units of the high power broadcasting transmitters for Kalundborg (Denmark) and Lisbon (Portugal), and a range of radio transmitters and receivers intended for use in aircraft.

Electrical Commercial Travellers

The Electrical Trades' Commercial Travellers' Association is holding its annual dinner on February 24th at 6.30 for 7 p.m.

The new Ealing electricity showrooms

at the Connaught Rooms, Great Queen Street, W.C. Tickets (12s. 6d. each) can be obtained from Mr. C. W. Boyce, hon. secretary, 58, Canterbury Road, Harrow, Middlesex.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances :—

CHEMICALS, ETC.	Price Feb. 1st.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£19 15s.	—
a Potash, Chlorate ... ... per lb.	3½d. to 4½d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac T.N. ... ... per cwt.	£3	—
a Sulphur Commercial... ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3½d. to 3¾d.	—
a ,, Crystals... ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil ... ... ,,	1/2 to 2/0	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£139	£2 inc.
Grade II ... ... ,,	£99	£2 inc.
Grade III ... ... ,,	£53	—
c Brass (rolled metal 2" to 12" basis) per lb.	7d.	—
c ,, Tubes (solid drawn) ... ... ,,	8¼d. to 9d.	—
c ,, Wire, basis ... ... ,,	7¾d.	—
c Copper Tubes (solid drawn)... ... ,,	9¼d.	—
g ,, Bars (best selected)... ... per ton		
g ,, Sheet ... ... ,,	£61	—
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£36 5s.	—
d ,, ,, Sheets ... ,,	£64	—
d ,, ,, Wire Rods ... ,,	£41	—
d ,, ,, H.C. Wire ... per lb.	6 1/16d.	1/16d. dec.
f Ebonite Rod ... ... ,,	1/3 to 1/6	—
f ,, Sheet ... ... ,,	1/3 to 1/6	—
n German Silver Wire ... ... ,,	2/2	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para fine ... ... ,,	4¾d.	—
i Iron, Pig (Cleveland No. 3)... ... per ton	62/6	—
i ,, Wire, galv. No. 1, P.O. qual. ,,	£20	—
g Lead, English pig ... ... ,,	£12	—
g Mercury ... ... per bot.	£9 17s. 6d. to £10 12s. 6d.	12s. 6d. dec.
e Mica (in original cases) small ... per lb.	6d. to 3/6	—
e ,, ,, medium ... ,,	4/– to 8/–	—
e ,, ,, large ... ,,	8/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1d.	—
p ,, ,, drawn bars & rods ,,	10¼d.	—
p ,, ,, rolled strip & sheet ,,	10½d.	—
p ,, ,, wire ... ... ,,	11¾d.	—
o Platinum ... ... per oz.	£7 10s.	10s. dec.
d Silicum Bronze Wire... ... ... per lb.	7¾d.	1/16d. dec.
r Steel, magnet, in bars ... ... ,,	7¼d.	—
g Tin, Block (English)... ... ... per ton	£149 to £151	£3 dec.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	2s. 11d.	2d. dec.

Quotations supplied by :—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. F. Dennis & Co.

Social Events

The annual dinner of the British Institute of Engineering Technology and the British Tutorial Institute was held on January 26th at the Restaurant Frascati, W., Mr. Hill presiding in the absence, through illness, of the Earl of Cottenham. In proposing the toast of "The Institutes," Mr. A. B. Cooper referred to the progress made during the period of depression. This was due to the service given to students by the Institutes, and to the recommendation of past students. A loyal and efficient staff had also largely contributed to the success. Mr. T. Aubertin (the principal), in responding, said that during the current month alone the two Institutes had enrolled 1,183 new students. He then enumerated the successes in the different fields of engineering, and said that, of the students who completed their course, 94 per cent. passed the various examinations, while the commercial institute showed 187 successes (92.5 per cent.). Mr. Graham Moore proposed the health of the ladies, and Miss M. Watkin responded. Professor A. M. Low proposed the toast of "The Chairman," to which Mr. Hill replied.

The social club of the Wolverhampton Corporation Electricity Department recently held its annual general meeting at the Trocadero Hotel, when a representative attendance included Mr. T. A. G. Margary (chief engineer), who is president of the club, and Mr. Elliott (chief assistant engineer), a vice-president. Mr. A. Taylor (retiring chairman) stated that the funds of the club exceeded £200, and that the various sections had all experienced a good year. A special committee was appointed to elect officers for the coming year, and this body met on January 25th, when Mr. F. Bowles was elected chairman, Mr. Chick vice-chairman, and Mr. Martin secretary.

The staff of Brook Motors, Ltd., held a whist drive, dinner, and dance at the Princess Café, Huddersfield, on January 27th. There were over ninety persons present, including Mr. Ernest Brook (managing director) and Mrs. Brook, Messrs. Joseph L. Brook, A. Stocks, and W. Mills (directors), and friends of the staff. The function commenced with a whist drive, the dinner followed, and an enjoyable evening was concluded with dancing.

The sixth annual dinner of the S.W. and S. Area Circle took place at Droitwich on January 26th; the president of the Circle, Mr. J. T. H. Legge, took the chair, and among the guests were Mr. A. C. Cramb, director of E.D.A., Mr. W. J. Jones, E.L.M.A., and Mr. G. R. J. Parkinson, Midland Electric Corporation for Power Distribution. Mr. W. J. Jones proposed the toast of "The Circle," and Mr. G. King, Evesham, responded. Mr. W. Donovan gave "The Visitors" and the reply was made by Mr. Cramb. Mr. J. Freeman, Dudley, proposed the president's health and Mr. Legge briefly acknowledged the toast. A good musical programme was provided.

New Ealing Showrooms

The new electrical showrooms of the Ealing Corporation, illustrated on this page, adjoin the Town Hall. The building is in Portland stone, and the windows and doorways are bronze. The site cost £10,500, and the building, which comprises a showroom with offices above, cost £11,400. The building is being equipped as an "all-electric" house, and it is intended to give demonstrations and lectures from time to time. The interior lighting is carried out with Holophane fittings, while this company's system of colour lighting has been installed in the showroom and is brought into use each evening after closing hours. The exterior of the building is floodlighted.

The Financing of Distribution

On Tuesday last representatives of the electrical industry and others were entertained by the United Dominion Trust, Ltd., at its new offices at Regis House, King William Street, E.C. Mr. J. Gibson Jarvie, chairman and managing director, said that the company was out to finance the distribution of almost any form of merchandise. It now had seven branches throughout the country. It was connected with the Bank of England and there were two subsidiary companies, including a special organisation for the electrical industry, named the United Dominion Trust (Electric), Ltd. The world could not recover unless it could distribute the goods it was capable of producing. Mr. Angus Bennett, a principal of the electrical subsidiary concern, said that they realised the immense field for development within the electrical industry and they were anxious that electrical contractors should realise the great advantage to be gained by the intelligent use of organised credit.

A Brighton Hire Scheme

The borough electrical engineer of Brighton (Mr. W. N. C. Clinch) has prepared a scheme for hiring cookers and other electrical apparatus with "the minimum formality to the consumer in completing a hire agreement, the least expense and inconvenience to the consumer arising out of the installation of such hired apparatus, and the provision by the undertaking of additional service staff."

There was a lengthy debate on the report at the last meeting of the Corporation. It was agreed that three sizes of cookers should be hired for a minimum period of three years

at 6s. 9d., 8s. 6d., and 10s. per quarter respectively, and that where a consumer had not selected a private firm to do the wiring, the Electricity Department should undertake that work. The question of wiring gave rise to a protracted discussion. Ald. Kingston, who moved the Committee's report, said they proposed to hire out cookers only in connection with hot-water boilers. In the area there were only 740 cookers in use. They wanted to sell more electricity. The Committee invited the co-operation of contractors in every way, and they would have the right to do the wiring for customers whom they introduced. Contractors' clients could go to the new showrooms and select the cookers wanted, but the Corporation should have the right to do the wiring for customers they obtained themselves.

Councillor Walling led the opposition, and moved an amendment referring the proposals back to the Committee. He described the proposal for the Corporation to do wiring as unfair to ratepayers, consumers, and contractors. It was unfair to borrow £10,000 to carry out the scheme of the Committee, because the scheme would be in the hands of the officials, and no contractor would dare to criticise in case of disputes because of fear of being blackballed. It was embarking on retail trade, and private tradesmen would be driven out of existence. On a division the report was referred back to the Committee by forty-six votes to seventeen.

Sir Kingsley Wood at the Standard Telephone works

For Sale

Mr. Henry J. Shaw will sell by auction on February 7th, at Borough Warehouses, Talbot Yard, Borough High Street, S.E., wireless and electrical goods. (See our classified advertisements.)

Jugoslavian Electrical Imports

During the first nine months of 1932 2,000 tons of electrotechnical goods, valued at 82 million dinars (230-275 dinars = £1), were imported into Jugoslavia. In the corresponding period of 1931 the imports amounted to 3,600 tons of the value of 131,900,000 dinars.

Czechoslovakian Lamp Tax

It is announced from Prague that it is intended to bring into force in Czechoslovakia a tax on glow lamps and radio valves on March 1st. It is estimated that the tax will yield about 12,000,000 crowns per annum.

Italian Electrical Imports and Exports

The imports of electrical machinery, apparatus and cognate material into Italy during the ten months ended with October last had a total value of £1,745,430, as compared with £3,167,910 in the corresponding ten months of 1931. There was also a decrease in the exports of similar material from Italy during the same period—from £1,247,030 to £1,172,100.

Sarawak Duties on Electrical Apparatus

The Sarawak Government has introduced changes in its Customs tariff with regard to certain goods. These include electrical and wireless apparatus which were previously admitted free of duty. Under the revised scale a preferential tariff is imposed on this class of apparatus of 10 per cent. *ad valorem*, with a general tariff of 30 per cent.

New Catalogues and Lists

Revo Electric Co., Ltd., Britannia Works, Tividale, Tipton, Staffs.—A folder illustrating various designs of electric fires. Priced.

Falk, Stadelmann & Co., Ltd., 83-93, Farringdon Road, E.C.—A leaflet giving prices and brief particulars of "Efesca" electric irons.

General Electric Co., Ltd., Magnet House, Kingsway, W.C.—Leaflet A.G.6436, describing a portable cleaner and groomer. Also a folder illustrated in colour concerning "Osram" turn-down lamps for hospitals, sick rooms, night nurseries, &c.

Tangyes, Ltd., Cornwall Works, Birmingham.—Lists Nos. 448, 455, 456, and 462 dealing respectively with garage equipment, a bucket and plunger pump, and the new "AR" type centrifugal pump, and power presses.

Igranic Electric Co., Ltd., 149, Queen Victoria Street, E.C.—Leaflet No. 120 relating to an ironclad motor-starting panel.

W. E. Burnand & Co., 66 to 106, Shoreham Street, Sheffield.—A pamphlet drawing attention to the company's impulse transformers and quick-acting and quick-test jigs.

London Electric Firm, South Croydon.—A leaflet illustrating Purley Way, Croydon, illuminated by sodium lamps.

Brookhirst Switchgear, Ltd., Northgate Works, Chester.—Folder No. 397 illustrating various types of a.c. motor control gear.

Clang, Ltd., Crown Yard, Cricklewood, N.W.2.—A folder containing particulars and illustrations of "Clang" electrical accessories.

Mycalex (Parent) Co., Ltd., 337, Thames House, Millbank, S.W.—A pamphlet containing particulars and prices of "Mycalex" insulating material.

Morse Chain Co., Ltd., Letchworth, Herts.—A brochure (ML. 1232) drawing attention to Morse flexible couplings.

Riverside Manufacturing Co., Ltd., River Terrace, Crisp Road, Hammersmith, W.—An illustrated and priced folder of electric clocks.

National Gas & Oil Engine Co., Ltd., Ashton-under-Lyne.—No. 115 of the "National Bulletin," describing a new series of totally enclosed vertical heavy-oil engines.

Phillips & Sons Electrical, Ltd., 40/42, Waterford Road, Walham Green, S.W.—An illustrated leaflet giving details of the "Meco" portable electric blower.

Westinghouse Brake & Saxby Signal Co., Ltd., 82, York Road, King's Cross, N.—A booklet describing the company's battery-charging sets.

A. F. Bulgin & Co., Ltd., Abbey Road, Barking.—A comprehensive catalogue (list No. 152) of radio components, including a manual giving technical details of the company's products.

English Electric Co., Ltd., Queen's House, Kingsway, W.C.—A well-produced brochure on electric arc welding containing some excellent illustrations of the various sets made by the company.

Switchgear & Equipment, Ltd., Banbury, Oxon.—An illustrated folder drawing attention to "S. & E." switches for voltages from 6,600 to 132,000.

Thomas & Son (Worcester), Ltd., Windmill and Pump Works, Worcester.—List No. OB3 describing "Climax" oil-bath windmills; a booklet dealing with "Climax" pumps and pumping machinery; and a leaflet relating to a single-cylinder, double acting, self-oiling, ungeared piston pump with electric motor.

W. T. Henley's Telegraph Works Co., Ltd., Holborn Viaduct, E.C.—A folder advertising the "Solon" electric soldering iron.

Taylor, Tunnicliff & Co., Ltd., Eastwood, Hanley, Staffs, and **Electric Transmission, Ltd.,** Culford Works, Kingsbury Road, Islington, N.—A profusely illustrated catalogue of strain and suspension insulating clamps and accessories for overhead transmission lines; a brochure dealing with switchgear insulators; and a publication covering pin-type insulators and spindles for overhead lines.

Elliott Bros. (London), Ltd., Century Works, Lewisham, S.E.—Catalogue sheets A77-80 and B141-144 illustrating and describing the company's miniature instruments, comprising moving coil, moving iron, thermal and metal rectifier types for d.c. and a.c. measurement.

Philips Industrial, 145, Charing Cross Road, W.C.—Publication (B.407), concerning the "Philivox" electric power gramophone.

H. G. Moseley & Co., Ltd., Eddo Works, Hospital Street, Birmingham.—An illustrated folder (No. 2032) containing particulars of electric fires, together with a revised price list.

Automatic Coil Winder & Electric Equipment Co., Ltd., Winder House, Douglas Street, S.W.—Two cards advertising respectively the "Zeva" electric soldering iron and the "Avometer."

Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester.—Publication No. 7795/1-1, describing a new blast-furnace plant with complete electrical charging gear.

British Ropes, Ltd., 52, High Holborn, W.C.—A brochure giving details of overhead transmission lines, conductors and fittings, with tables of data relating to conductors, copper wire, &c.

Winding-up Order

Radia Electric Co. (Gloucester), Ltd.—In the Companies' Winding-up Court on January 23rd Mr. Justice Maugham had before him a petition for the winding-up of this company. His Lordship made the usual compulsory order.

Private Arrangements

B. A. Pilkington, 48, Frederick Street, Edinburgh, electrical engineer.—A meeting of creditors was held recently in Edinburgh, when a statement of affairs was submitted which showed liabilities of £1,648 and net assets of £1,310. The debtor attributed his position to delay in settlement of a certain contract, on which, it was stated, an amount of £300 was due to him, and expenses of a forced removal. No offer was made, and it was resolved that a trust deed should be executed in favour of Mr. Durham, Edinburgh, and Mr. McMilland, as joint trustees, with a committee of inspection. In the event of the debtor not coming forward with a reasonable offer within ten days the estate is to be wound up. The following are creditors:—Edison Swan Electric Co., Ltd., £280; General Electric Co., Ltd., £127; W. T. Henley's Telegraph Works Co., Ltd., £371; Tudor Accumulator Co., Ltd., £106; and Macpherson and Mackay, £126.

J. Lyon, trading as John Lyon & Son, 3, London Street, Southport, electrical engineer.—A meeting of creditors was held on January 19th, when a statement of affairs submitted showed ranking liabilities of £706, and net assets of £222. The position was attributed to lack of capital, keen competition and heavy overhead expenses. A resolution was passed confirming the deed of assignment already executed to Mr. T. H. Sutton. A committee was also appointed. The following are creditors:—Baxendale & Co., Ltd., £53; Electric Lamp Factors, £142; General Electric Co., Ltd., £51; Hotpoint Electric Appliance Co., Ltd., £143.

C. Rushton, trading as Margrave Radio, 34, London Road, Twickenham.—A meeting of the creditors of the above was held recently, when a statement of affairs was submitted which showed liabilities of £1,453 and net assets of £110. It was resolved that a deed of assignment should be executed in favour of Mr. Dickenson, 82, Victoria Street, S.W.1, as trustee, with a committee of inspection.

Bankruptcy Proceedings

J. R. Lister (trading as Roland Radio), radio engineer, 6, Watford Way, Hendon.—The public examination was held on January 20th before Mr. Registrar Mellor at the London Bankruptcy Court. He failed last November with liabilities £806 against assets £100. Replying to Mr. Bruce Park, Assistant Official Receiver, the debtor stated that in November, 1928, with £80 advanced by his father, he began business as a dealer in wireless and tennis goods as above described. He was successful until 1930 when a number of similar shops were opened in the immediate vicinity, and his business began to decline. Being pressed by creditors, whom he was unable to pay, he filed his petition. The failure was caused by keen competition, bad trade, and lack of capital. The examination was concluded.

W. H. Talbot (the City Radio Supplies), Penny Street, Blackburn, Lancs, electrical dealer.—The public examination was resumed recently at the County Court House, Blackburn. The statement of affairs lodged showed a deficiency of £271. At the previous hearing debtor had been requested to file an account of all moneys received and expended over the whole period of his trading. He stated that he had been unable to comply with the order owing to a number of documents having been destroyed or lost. The Registrar instructed him to produce particulars of his transactions with tradesmen, and the examination was again adjourned.

M. Goldsmith (The Regent Radio Co.), 24, Russell Street, Plymouth.—The public examination was held recently at Plymouth. The statement of affairs showed liabilities of £720 and there was an estimated deficiency of £515. The examination was adjourned.

W. Rowlands, wireless dealer, 56, High Street, Bethesda.—Receiving order made January 20th on debtor's own petition.

E. S. Rees, wireless dealer, 4, High Street, Llanhilleth.—Public examination February 16th at the Town Hall, Tredegar.

C. Bassham (Ashton & Holt), electrical engineer, 16, Cross Street, Ryde.—Application for discharge to be heard on March 1st at the Town Hall, Ryde.

S. L. Holt, electrical and radio engineer, 46, Highland Terrace, Uffculme.—Last day for receiving proofs for dividend February 9th. Trustee, Mr. W. R. Cocks, Exeter Bank Chambers, Broadgate, Exeter, Official Receiver.

F. Finch, radio engineer, 2a, Fishergate Hill, Preston.—Last day for receiving proofs for dividend February 8th. Trustee, Mr. H. Parker, 9, Cannon Street, Preston, Official Receiver.

H. Bennett, wireless engineer, 9, First Avenue, Wrea Green, near Kirkham.—Receiving order made January 24th on debtor's own petition.

A. Robson (Anson Radio), wireless engineer, 147, Dickinson Road, Rusholme, Manchester.—Last day for receiving proofs for dividend February 11th. Trustee, Mr. F. Murgatroyd, Byrom Street, Manchester, Senior Official Receiver.

S. J. Garrod (Electrical Repair & Manufacturing Co.), electrical engineer, 181, St. John Street, E.C.—Receiving order made January 16th on debtor's own petition. Public examination March 23rd, at Bankruptcy Buildings, Carey Street, W.C.

J. T. Eaton (XL Service Station), wireless dealer, 13, Bolton Road, Bury.—Receiving order made January 17th on debtor's own petition. Public examination, February 14th, at the Court House, Mawdsley Street, Bolton.

W. F. Hurry (Bijou Portable Radio Co.), 157, Junction Road, Highgate, N.—Last day for receiving proofs for dividend February 4th. Trustee, Mr. E. Parke, Bankruptcy Buildings, Carey Street, W.C.

G. A. Laird and **D. Hyde** (Burbury, Laird & Co.), 6, Warwick Row, Coventry.—Last day for receiving proofs for dividend, February 6th. Trustee, Mr. M. G. Dudley, 2, Stoneleigh Terrace, Coventry.

E. L. Spring, electrical and wireless dealer, 61, Dovecot Street, Stockton-on-Tees.—First and final dividend of 2s. 4d. in the £, payable January 31st at 80, High Street, Stockton-on-Tees.

G. M. Jacob, 29, Dimond Street, Pembroke Dock, Pembroke, radio dealer.—The public examination was held recently at the Shirehall, Haverfordwest, when debtor attributed her failure to trade depression. The examination was closed.

S. A. Sears, radio engineer, 98, High Street, Redbourn.—Receiving order made January 25th on debtor's own petition.

G. D. Whitham, electrical engineer, 86, Orford Lane, Warrington.—Trustee, Mr. P. S. Booth, 2, Bixteth Street, Liverpool, appointed January 26th.

Company Liquidations

Moggs Electrical Co., Ltd., 25, Paddington Street, W.1, electrical engineers.—The statutory meeting of creditors was held recently at 192, Bishopsgate, E.C.2, when a statement of affairs was submitted which disclosed liabilities of £926 and assets estimated to realise £328. A resolution was passed appointing Mr. J. Black, 5, Finsbury Square, E.C.2, as liquidator, with a committee of inspection.

Barrow Radio, Ltd., 217, Dalton Road, Barrow-in-Furness.—At a meeting of the creditors, held recently at Ramsden Square, Barrow-in-Furness, figures were submitted showing liabilities of £621 and net assets of £113. It was stated that the issued capital of the company amounted to £915, so that as regarded contributories there was a deficiency of £1,425. Mr. H. Mossop, of Barrow-in-Furness, was nominated as liquidator.

Johnsons Radio & Television, Ltd.—Winding up voluntarily. Liquidator, Mr. F. E. Bendall, Midland Chambers, Warwick Passage, Corporation Street, Birmingham. Particulars of claims to the liquidator by March 3rd.

Tekade Radio & Electric Co., Ltd.—Particulars of claims by March 7th to the liquidator, Mr. C. Latham, 78, New Oxford Street, W.C.

Hammond Bros. & Champness, Ltd.—Winding up voluntarily. Liquidator, Mr. A. E. Quaife, 104, High Holborn, W.C.

Slough Radio Co., Ltd.—Winding up voluntarily. Liquidator, Mr. H. Miller, 18, Mackenzie Street, Slough.

Dissolution of Partnership

Gilbert & Bunn, electrical engineers and contractors, 17, Brougham Street, Birmingham.—Messrs. L. S. Gilbert and S. P. Bunn have dissolved partnership.

Electricity Supply

Lighting, Domestic, Power

Bala.—ELECTRICITY SUPPLY REFUSED.—The Council has made an application for an electricity supply, but owing to its remoteness from the nearest supply area and the heavy cost that would necessarily have to be incurred in providing a supply, the North Wales and South Cheshire Joint Electricity Authority has decided that it cannot comply with the request.

Birmingham.—A RECORD WEEK.—Sir Percival Bower, chairman of the Electric Supply Committee, reported on January 25th that in the preceding week there was a record output in Birmingham of 13,000,000 kWh of electricity. New consumers connected now exceed one thousand a month, and during the quarter ended December, 3,169 additional premises were provided with supplies. Sales of electrical energy during that period showed an increase of over ten per cent. as compared with the corresponding period of 1931. Taking the nine months of the financial year to date, the rate of increase in sales amounted to over twelve per cent., as compared with rather more than seven per cent. in the quantity generated for the country as a whole during 1932.

Bolsover.—SUPPLY TO HILLSTOWN.—It was reported to the Urban District Council on January 24th that no objection would be offered by the County Council or the Notts and Derby Power Co. to the application for a Fringe Order to supply electricity to Hillstown under the Council's scheme. The district is in the area of the Notts and Derby Power Co., and the only objection was that of the Blackwell Rural District Council, which took exception to the use of overhead lines. The matter is being taken up with the Blackwell Council with a view to the opposition being withdrawn.

Bromley (Kent).—MAINS EXTENSIONS.—The Town Council has decided to extend the mains in Canon Road and on the Grove Park Heights Estate. There is also to be a h.p. main to supply the new premises of the South Suburban Co-operative Society, Ltd.

Colne (Lancs).—CHANGE-OVER.—A scheme for changing over to a.c., involving an expenditure of £2,177, has been approved, and permission is now to be obtained to raise the necessary loan.

Dornoch.—PROGRESS OF THE ELECTRICITY SCHEME.—The Dornoch electricity scheme was advanced another stage on Saturday last when two separate cables, each measuring nearly a mile in length and weighing 25 tons, were laid across the Firth at Meikle Ferry. The task was a difficult one, particularly at the start and finish, as the depth of the water did not permit the boats to get close inshore; two vessels took part in the work. One of the cables is a spare for use in the case of temporary difficulties or if extra power should be required in the future by the town. The work is being carried out by Messrs. Balfour, Beatty & Co., the supply coming from the Ross-shire Electric Supply Company's mains near Tain. Among those who were present at the laying of the cables were Sir Robert Brooke, of Midfearn, Colonel E. W. Blunt-Mackenzie, of Castle Leod, Mr. T. Dalling, manager, and Mr. Norman Campbell, assistant manager of the Ross-shire Electric Supply Co., Mr. M. McHassie, manager, and Mr. J. D. Marr, constructional engineer of Messrs. Balfour, Beatty & Co. A view of the cable *en route* to Dornoch appears on page 167.

Dumfries.—SUPPLY TO LOCKERBIE.—The inauguration of the electricity distribution scheme of the Dumfries County Council is to take place in the Town Hall, Lockerbie, on February 4th, when Sir Andrew R. Duncan will switch on the supply to the first section, which includes the burghs of Annan and Lockerbie.

Dundee.—GENERATING STATION TO CLOSE DOWN.—The city electrical engineer announced at a recent meeting of the Electricity Committee that the generating station at Carolina Port, which has been taken over by the Central Electricity Board, will close down from February until October 16th this year. Over fifty men were employed in Carolina Port station and of this number only a few would be needed.

East Grinstead.—CHANGE-OVER.—The Council has decided to carry out mains extensions, and to change over to a.c. in the Coombe Hill and Holtye Road districts.

Edmonton.—LIGHTING AN ARTERIAL ROAD.—A special meeting of the Urban District Council is to be held to decide whether electricity or gas shall be used for lighting the Cambridge arterial road.

Falkland (Fife).—SUPPLY TO HOUSING ESTATE.—The Town Council have opened up negotiations with the Fife Electric Power Company to have electricity installed at the new housing scheme at Lomand Crescent.

Glasgow.—SHETTLESTON AND TOLLCROSS SUPPLIES.—As from February 1st, the Corporation has taken over the electric lighting of the Shettleston and Tollcross area, which has hitherto been supplied by the Clyde Valley Electrical Power Co. The company still retains certain power rights in the area.

Hull.—EXTENSIONS.—In order to meet the increasing demands for electricity, the borough electrical engineer reports that three additional sub-stations and extensions to the e.h.p.

and l.p. networks are necessary during the coming year. He estimates the cost of such extensions at £15,102, and the Electricity Committee is to apply for sanction to a loan to cover the cost of the work.

ANNUAL ESTIMATES.—The annual estimates submitted to the Electricity Committee on January 26th show a total income for the coming year of £566,750. Receipts for the financial year now drawing to a close were put at £526,525, showing a surplus of £47,831. During the past month 2,000 new services and 1,365 extensions to existing services had been supplied. It was decided to apply for sanction to a loan to carry out alterations at the Osborne Street station.

Iraq.—GOVERNMENT SELLS BASRAH POWER HOUSE.—An offer of £12,000 made by the Basrah Port Directorate—a department of the Iraq Government—to the British Government for the purchase of a power house established in Basrah during the War has been accepted. Since the War the power house has been run as a canteen for the benefit of the R.A.F. cantonment, and also as a profit-making concern selling electricity to the Municipality from the Port. The purchase price includes all buildings, plant and mains connected with the power house except for those actually in the R.A.F. cantonment. The present manager, Captain John Morris, will remain with the concern when it is bought by the Port Directorate.—*Reuter* (Basrah).

Irlam and Cadishead.—ELECTRICITY FOR FARMERS.—The Urban District Council, having received applications for a supply of electricity from farmers at Cadishead Moss, has decided to obtain particulars from the secretary of the local branch of the Farmers' Union. The matter has been raised with the Stretford and District Electricity Board, whose engineer is to estimate the cost of a scheme for supplying farms at Irlam and Cadishead Moss.

Isle of Thanet.—REDUCED CHARGES.—The Isle of Thanet Electric Supply Co., Ltd., has adopted the following minimum charges as from the New Year:—Margate, 13s. 4d. per quarter with 8d. per kWh for over 20 kWh. Broadstairs, winter quarters 10s. and 8d. per kWh for over 15 kWh; summer quarters 6s. 8d. and 8d. per kWh for over 10 kWh; Isle of Thanet Rural, 11s. 8d. plus 7d. per kWh for over 20 kWh; Westgate and Birchington, winter quarters 12s. 6d., plus 10d. per kWh for over 15 kWh; summer quarters 8s. 4d., plus 10d. per kWh for over 10 kWh.

Kingston-on-Thames.—APPLICATION FOR LOAN.—The Town Council has decided to apply for a loan of £4,000 for seven new transformers; £6,776 for replacing cables in certain roads; and £7,505 for the assisted wiring scheme.

MAINS EXTENSIONS.—It is proposed to extend the mains to an area of 25 acres near Park Road, which is to be transferred from the Malden district to the borough.

Llandrindod Wells.—PURCHASE OF UNDERTAKING.—The Urban District Council has received a further offer from the Shropshire, Worcestershire and Staffordshire Electric Power Co., for the purchase of the electricity undertaking. The Council is to confer with the Electricity Commissioners and with Mr. J. W. Burr, electrical engineer, Swansea.

London.—BATTERSEA.—The Borough Council is to apply to the Electricity Commissioners for sanction to borrow £11,695 for the provision of machinery and coal-handling plant at the generating station, and £20,000 for the rental wiring scheme. A site has been secured in Grayshott Road for the provision and equipment of a sub-station.

The Electricity Committee is to provide electricity services to 192 premises at an estimated cost of £1,192.

ST. MARYLEBONE.—The Electricity Committee reports, with regard to the decision approving expenditure of £25,153 in connection with further supplies of 6,600-V switchgear to replace the earlier type switchgear at the generating station, that the Hampstead Borough Council has intimated that it approves of the existing switchgear used exclusively for bulk supplies to Hampstead being replaced and also the proposal that £17,618 shall be chargeable to it in respect of such replacements, the latter amount to be raised by the St. Marylebone Council by way of loan, and the loan charges and interest thereon to be debited to the Hampstead Council.

Maidstone.—LOANS.—The Town Council has received sanction to a loan of £10,000 for mains extensions, and has applied for sanction to a loan of £6,000 for the assisted wiring scheme.

Morecambe.—INSTALLATION INSPECTOR RECOMMENDED.—A report has been submitted by the borough electrical engineer upon the advisability of the Electricity Department inspecting all new installations in dwelling-houses and other premises before providing a supply of energy to them. The engineer pointed out that some years ago this service was rendered by the Corporation, but for many years no inspections or tests had been carried out prior to connection. He recommended the engagement of an installation inspector and tester, the major portion of whose time would be taken up with this particular work, and who could be employed in other directions when not so engaged. The Committee recommended the engagement of an installation inspector and tester, but the question of the appointment was deferred pending submission by the electrical engineer of a series of draft specifications and regulations to govern installations in premises, and data to form the basis of the terms of engagement of the inspector.

Oakham.—SUPPLY TO RURAL AREA.—The Rural District Council has decided to request the Electricity Commissioners that a supply of electricity to parishes in the rural area should be given by the Mid-Lincolnshire Electricity Co., which has expressed willingness to take over the electricity obligations of the Oakham Gas Co., which obtained powers to supply electricity in 1923.

Persia.—ELECTRICITY FOR TEHERAN.—It is reported from Teheran that the Government has signed a contract with the Société Traction et Electricité under which the latter will establish plants for the supply of electricity for power and lighting purposes in the capital city.

Another before-and-after picture: Christ Church, Dore, near Sheffield, lighted by gas (left) and by means of Holophane concealed lighting (right)

Plymouth.—MAINS EXTENSIONS.—The Electricity Committee has authorised cable extensions in fifteen streets and on the Moor Farm building estate, at an estimated cost of £3,279.

Prescot.—PURCHASE OF UNDERTAKING.—The Liverpool City Council is considering the purchase of the Prescot undertaking from British Insulated Cables, Ltd., for £136,278. If the purchase takes place it is hoped that the prices will be brought down to Liverpool's level by 1941.

Reigate.—EXTENSIONS.—The Rural District Council has decided to raise no objection to the use of overhead lines for the supply of electricity to Betchworth and Headley by the London and Home Counties Joint Electricity Authority.

Rheidol (Cardiganshire).—HYDRO-ELECTRIC SCHEME.—The County Council has decided to give its support to the proposed hydro-electric works on the River Rheidol.

Ripon.—APPLICATION TO THE CENTRAL BOARD.—The Rural District Council has passed a resolution urging the Central Electricity Board to seek powers to control the installation and distribution of electricity in the area with a view to reducing the cost per kWh in the rural districts.

Rugby.—ALTERNATIVE LIGHTING CHARGE.—The Town Council has adopted an alternative lighting tariff for business consumers who continuously use electricity for lighting in the day time. This is a fixed charge of £10 per annum per kW of lighting load installed, plus a charge of ¾d. per kWh.

Stirling.—BULK SUPPLY.—The position of the electricity undertaking has been discussed by the Corporation. It appears that the Central Electricity Board is not in a position to supply electricity direct to the Town Council, but it will give the supply through the Scottish Central Electric Power Co. If the Town Council should cease generating electricity at its own station at Stirling, compensation will be payable to employés who will be dismissed.

Stoke-on-Trent.—LOAN APPLICATIONS.—The Electricity Committee has received sanction to borrow £4,800 for a supply to the Dimsdale area of Wolstanton; £10,350 for additional e.h.p. feeders and sub-station equipment for a supply to Mossfield Colliery; £4,000 required for a supply of electricity to Milton; £5,000 for house wiring installations; and £2,000 for a supply to Hollywall Lane Housing Estate, Goldenhill. Permission is being sought to borrow £1,000 in respect of small motors let out on hire-purchase terms.

TRANSFORMER INSTALLATION.—The Committee has decided to install an additional transformer at the High Street West sub-station, Stoke, at an estimated cost of £300.

Stonehaven.—ELECTRIC LIGHTING.—The Grampian Electricity Supply Co. announces that it is now in a position to install electricity in the town.

Wayland.—EXTENSION OF AREA.—The Rural District Council has decided to write to the Electricity Commissioners pressing for the inclusion of all the parishes in its district, with the exception of Attleborough and Besthorpe (which are already supplied from Norwich), because of the delay on the part of the East Anglian Supply Co. in providing a supply.

West Bromwich.—LOAN.—The Electricity Committee is to apply for sanction for a loan of £5,000 for extensions.

Wooburn (Bucks).—STREET LIGHTING.—The Parish Council has accepted the offer of the Cookham and District Electricity Co., Ltd., for public lighting with eighty-six lamps.

Traction

France.—ELECTRIC SNOW-PLOUGH.—According to the *Railway Gazette*, on the Midi section of the electrified Toulouse-Barcelona line, a snow-plough of entirely new design has just been set to work. Intended to clear away snow to a depth of 5 ft., two rotary wheels with a diameter of 4 ft. are employed, but these may be swivelled as required through an angle of 180 deg., and are effective over a width of 10 ft. 6 in. Current for the two 130-h.p. scoop motors is taken from the overhead line by a pantograph, but the 13-ton vehicle has no traction motors, and is propelled at a speed of 3½ to 6 m.p.h. by an electric locomotive.

RAILWAY ELECTRIFICATION PROGRESS.—The electrification of the main line between Orléans and Tours has just been completed by the Paris-Orléans Railway, and operation will commence within the next week or two. This 68-mile stretch of double track is supplied at 1,500 V d.c. by five automatically controlled sub-stations, and is an extension of the already electrified Paris to Orléans section.

Irish Free State.—DUBLIN TRAMWAYS.—Double-deck luxury trams are to be brought into use on the Dublin-Howth route by the Dublin United Tramways Co. These trams will save ten minutes on the journey as compared with the present trams.

Japan.—TROLLEY-BUSES FOR TOKYO.—Our Yokohama correspondent reports that an application by the Tokyo municipality for permission to run trolley-buses has been sent to the Department of Home Affairs.

Norwich.—PURCHASE OF TRAMWAYS.—Following the vote against the purchase of the tramways by the city (ELEC. REV. Jan. 20th, page 99) the Corporation has abandoned the part of its Parliamentary Bill relating to the purchase.

South Shields.—TRAMWAY EXTENSION.—Mr. J. Austin Baker, the tramways manager, is recommending the Town Council to extend the tramway service by a loop line from the present terminus at the Wouldhave Monument along Pier Parade, returning to the Monument *via* Sea Road. He recommends also that the line be extended along Boldon Lane from the top of Stanhope Road. The Committee proposes to buy old tramcars with a view to having them reconditioned and put into service.

This picture shows the elaborate control arrangements fitted in the driver's cabin of the new electric express locomotive running between Berlin and Hamburg

Communications

Continental.—RADIO LICENCES.—According to *World-Radio*, the numbers of broadcast-receiving licences in force in certain European countries at the close of 1932 were as follows: Germany 4,307,722; Denmark 499,235; Belgium 350,000; and Switzerland 231,400.

Great Britain.—RADIO RELAY EXCHANGES.—For the purpose of establishing a service for relaying wireless entertainment to subscribers and others in Ilfracombe and the neighbourhood (in agreement with the Ilfracombe Urban District Council and Rediffusion, Ltd.), a private company, known as the North Devon Rediffusion Services, Ltd., has been formed with a capital of £1,000. The three directors are all associated with Standard Radio Relay Services, Ltd., and associated companies, the registered offices of which are at Bush House, Aldwych, London.

Rediffusion, Ltd., has applied to the Preston Town Council for permission to establish a service.

The Northern Wireless Relay Co., Ltd., has asked the Blaydon-on-Tyne Urban Council to sanction the establishment of a service in the town. The Council has decided to seek further advice.

The Godmanchester Town Council has decided to enter into an agreement with Osman & Co. for the provision of a service for the borough.

The Margate Town Council has referred back for further consideration a recommendation to give permission to Rediffusion, Ltd., to establish a service in the town.

The Tendring Rural Council has decided to offer no objection to a service being installed at Parkeston by Mr. Henry Curtis, of Dovercourt, provided the Parish Council desires the service.

The Hull Corporation Housing Committee has been informed by Broadcast Relay Service, Ltd., that it considers the payment to the Corporation of five shillings per pole per annum excessive. It was decided to reduce the amount to 1s. per pole.

The Kettering Housing Committee recommends granting the application of Mr. Paul Taylor, of Kettering, for permission to establish a service for a period of three years.

The Hornsey Highways Committee has been informed by the company to which a licence was granted by the Council that it finds that the area is too small to permit of the successful development of a relay service and asks for an extension. The Committee recommends that the area be extended so as to include a portion of Harringay.

The Huddersfield Town Council has decided not to comply with a request from Broadcast Listeners' Service, Ltd., and Rediffusion, Ltd., that one of their representatives should be received by the Highways Committee with the object of giving full particulars of proposed services.

Japan.—REGIONAL BROADCASTING.—Listeners are to have the advantage of an organised service of alternative programmes in the near future, the Broadcasting Corporation of Japan having adopted a "regional" broadcasting plan on similar lines to that of the British Broadcasting Corporation. The station at Osaka is to be fitted with an additional transmitter which will broadcast simultaneously with the present Marconi installation to provide an alternative programme throughout the service area of the station. The new equipment will consist of a Marconi Type P.A. transmitter, of 10 kW power, incorporating the principle of low-power modulation. This type of equipment is installed and working at the Nagoya station. The present single transmitter at Osaka is also of Marconi manufacture; it is a type Q.D. installation of 10 kW power.

London.—TELEPHONY IN 1932.—The total number of calls originated in the London area during 1932 was 745,000,000. Inland trunk calls numbered 3,230,000, an increase of 14,000, and in the districts surrounding the Metropolis an additional 370,000 trunk calls were booked through London. The number of exchanges in London rose from 154 in 1931 to 232, including sixty automatic exchanges, 168 manual exchanges, two toll exchanges, and one trunk exchange. The number of exchange lines at the end of the year was approximately 470,000, and the net gain of subscribers in the year was 12,000. The number of telephones in use increased by 56,000 to 787,000.

Morocco.—IMPROVED TELEPHONE SERVICE.—During the past year the telephone service throughout Morocco was considerably extended. An underground cable was laid between Rabat and Casablanca, a distance of about 60 miles. The line comprises 33 four-wire and 111 two-wire circuits. An automatic exchange with 6,000 connections and provision for extension to 10,000 was opened in Casablanca. Automatic exchanges were also opened at Fez-Ville-Nouvelle and at Fez-Batha, the first being equipped with 1,500 and the second with 1,000 lines, with provision in both cases for extension to 2,000. Carrier-current services have been established between Rabat and Fez, 122 miles, and between Rabat and Meknes, 84 miles.

Spain.—TELEPHONE PROGRESS.—From the Director of the Red Telefonica de Guipuzcoa, San Sebastian, we have received a copy of the recently issued report on the development of the telephone system in the Spanish Province of Guipuzcoa during 1931. During the year eight new exchanges were opened, bringing up the total in the province to 216, with an aggregate of 3,158 subscribers, the latter being an increase of 184, or 6.23 per cent. over 1930.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—MELBOURNE.—March 7th. Department of Posts and Telegraphs. Telephone handsets. (A.X. 11675.)* March 21st. Tumbler switches. (A.X. 11676.)* Telephone terminal strips. (A.X. 11677.)* Microphone component parts. (A.X. 11678.)*

Barnes.—February 6th. Corporation. Traffic control signals. (January 6th.)

Belfast.—February 8th. Electricity Department. Steam piping, water piping and valves, &c., for the Harbour power station. (See this issue.)

Blackburn.—February 27th. Electricity Department. Cable, rubber insulated wire, and meters. (January 20th.)

Cardiff.—February 6th. Public Health Department. Staff signalling system at Llandough Hospital. (January 13th.)

Cheadle and Gatley.—February 10th. Electricity Department. Annual contracts for the supply of materials. (January 27th.)

Egypt.—CAIRO.—March 22nd. Lighting installation on the new bridge at Minia. (A.X. 11665.)*

Hamilton.—Electricity Department. L.p. cables. (January 27th.)

Hastings.—February 7th. Electricity Department. Materials for twelve months. (January 20th.)

Lanark.—February 7th. County Council. Various works, including electric lighting, in connection with the erection of 160 houses. Mr. P. C. Smith, County Housing and Town Planning Engineer, 13, Clydesdale Street, Hamilton.

Leeds.—February 21st. Electricity Department. Annual contract for stores. (January 27th.)

London.—HAMMERSMITH.—February 22nd. Borough Council. Stores and material for twelve months. (January 27th.)
STOKE NEWINGTON.—February 13th. Electricity Department. House service meters and l.p. cables. (January 20th.)

Manchester.—February 8th. Rivers Department. Overhead line at Davyhulme sewage works. (January 27th.)

Plymouth.—Electricity Department. February 6th. Meters, time switches, cables, transformers, and switchgear. (January 13th.)

Salford.—February 23rd. Electricity Department. Electrical apparatus and stores. (See this issue.)

South Africa.—JOHANNESBURG.—February 10th. Government Supplies Board. Lead-covered cable, switchboard cable, flameproof wire, v.i.r. wire, and 50,000 copper suspension rings. (A.X. 11662.)*
MOSUL BAY.—February 15th. Municipal Council. Generating plant, including water-tube boiler, alternator sets, switchboard panels, 100-kVA transformers and distribution material. (A.X. 11664.)*

Southend-on-Sea.—February 9th. General stores for twelve months. (January 13th.)

Stoke-on-Trent.—March 5th. North-West Midlands J.E.A. Transmission lines and outdoor static transformers. (January 27th.)

Swansea.—April 1st. Electricity Department. Stores for twelve months. (See this issue.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Brighton.—Electricity Committee. Accepted. Switchboard (£296).—British Thomson-Houston Co., Ltd. Transformers (£1,721).—Ferranti, Ltd.

Clydebank.—Fire and Lighting Committee. Standards, &c., for lighting of MacDonald's Brae (£161).—Revo Electric Co., Ltd.

Dundee.—Corporation Markets Committee. Accepted. Electrical work in connection with the extension of Shore Terrace Market (£82).—Lowdon Bros., Ltd.

Durham.—County Education Committee. Accepted. Electric lighting installation in schools:—Dean Bank (£305), G. Horne & Co.; Barnard Castle (£59), W. Sykes & Son; Chester-le-Street secondary school (£482), R. W. Leek Co. (in lieu of the tender of R. Robson, Willington at £450, withdrawn).

Halifax.—Town Council. Accepted. Electrical work in connection with the erection of shops and houses in King Cross Street.—Gath Electrical Co.

Hampton.—Metropolitan Water Board. Accepted. Cables for pumping plant.—General Electric Co., Ltd. (£78); Macintosh Cable Co., Ltd. (£78); W. T. Glover & Co., Ltd. (£98).

Hull.—Education Committee. Accepted. Electric lighting at Bricknell Avenue school (£265).—W. Palmer.
Telephones Committee. Recommended. Loading coils (£734).—Automatic Electric Co., Ltd. Cable (£365).—British Insulated Cables, Ltd. Conduits (£403).—Albion Clay Co., Ltd. Table telephones (£665).—Automatic Electric Co., Ltd.

Lanarkshire.—County Council. Accepted. Installation of electric lighting at forty houses at Law (£217).—A. Robertson.

Linlithgow.—Works Committee. Accepted. Electric lighting of the Victoria Hall.—A. A. Mayes.

London.—L.C.C.—Stores and Contracts Committee. Accepted. Electrical fittings for 12 months.—British Central Electrical Co., Ltd.; Edison Swan Electric Co., Ltd.; Falk, Stadelmann & Co., Ltd.; Samuel Heath & Sons, Ltd.; Kersons Manufacturing Co., Ltd.; Sloan Electrical Co., Ltd.; Sperryn & Co.; Ward & Goldstone, Ltd.; William White & Co. Electrical insulating materials.—M. Barr & Co., Ltd.; M. Bond & Co.; Dacier, Ltd.; Hamnett & Andrew; James North Hardy & Son, Ltd.; Hooper's Telegraph & India Rubber Works, Ltd.; Hunter, Son & Co.; Ioco Rubber & Waterproofing Co., Ltd.; Micanite & Insulators Co., Ltd.; Pomona Rubber Co.; Rotunda, Ltd.; Siemens Bros. & Co., Ltd.; F. Wiggins & Sons.
POPLAR.—Electricity Committee. Recommended. Re-equipment of boilers for coal burning (£16,599).—Underfeed Stoker Co., Ltd.
HORNSEY.—Electricity Committee. Recommended. 800-kW grid-type unit rectifier set (£3,425).—Hewittic Electric Co., Ltd.

Manchester.—Housing Committee. Accepted. Electrical installations at 860 houses on the Wythershawe estate.—H. C. Taylor & Co., Ltd.; R. H. Clampnett & Co., Ltd.
Electricity Committee. Accepted. Coal elevator renewal at Stuart Street station.—Marco Conveyor & Engineering Co.

Middlesex.—Mental Hospitals Committee. Accepted. Electrical installation at Shenley mental colony (£13,603).—Rashleigh. Phipps & Co., Ltd.

Morecambe.—Electricity Committee. Accepted. Feeder cable from Torrisholme to Woodhill Lane (£1,996).—W. T. Glover & Co., Ltd.

Rawtenstall.—Electricity Committee. Accepted. Cables.—Hackbridge Cable Co., Ltd.

Salford.—Electricity Committee. Recommended. Voltage regulator (£695).—Fuller Electrical & Manufacturing Co., Ltd.

Southall-Norwood.—Highways Committee. Accepted. Fire alarm system (£1,595).—Walter's Electrical Manufacturing Co., Ltd.

Southend-on-Sea.—Town Council. Accepted. Electrical illuminations at the Cliffs bandstand, shelters, &c., and maintenance during the summer season (£850).—F. P. Richard & Co.

Wealdstone.—Housing Committee. Recommended. Wiring, &c., at 316 Council houses (£978).—General Electrical Maintenance Co., Ltd.

West Lothian.—County Council. Housing Committee. Electric lighting installation at Bo'ness housing scheme.—D. Henderson.

Wrexham.—Rural District Council. Accepted. Electric lighting at housing estates at Rhos and Gwersylt (£329).—Jones & Williams.

Forthcoming Events

Physical Society.—Friday, February 3rd. Imperial College of Science and Technology, South Kensington, S.W. 5 p.m. Short papers.

Society of Engineers.—Monday, February 6th. Geological Society, W. 6 p.m. Presidential address. Mr. J. D. Haworth.

Institution of Electrical Engineers.—Monday, February 6th. Institution, London, 7 p.m. Discussion on "The 'Grid' and its Fulfilment of National Requirements." Opened by Messrs. H. Hobson and C. S. Davidson. (*Meter and Instrument Section.*)— Friday, February 3rd. Institution, London. 7 p.m. "Some Electrical Methods of Remote Indication." Messrs. C. Midworth and G. F. Tagg. Friday, February 10th. 7 p.m. Informal discussion, "The Advantages and Limitations of the Various Types of Two-part Tariff Prepayment Meters." (*South Midland Students' Section.*)—Saturday, February 4th. 3 p.m. Visit to Princes power station, Nechells. (*North Midland Students' Section.*)—Sunday, February 5th. 10 a.m. Visit to the Paramount Cinema, Leeds. (*South Midland Centre.*)—Monday, February 6th. University, Birmingham. 7 p.m. "An Analysis of the Costs of Electricity Supply and Distribution in Great Britain." Mr. J. M. Kennedy and Miss D. M. Noakes. (*North Midland Centre.*)—Tuesday, February 7th. Hotel Metropole, Leeds. 7 p.m. "The Relative Fuel Economy of Electricity, Gas, Oil, and Solid Fuel as Heating Agents." Mr. A. H. Barker. (*East Midland Sub-Centre.*)—Tuesday, February 7th. The College, Loughborough. 6.45 p.m. "Luminous Tube Lighting." Mr. C. C. Paterson. (*North-Western Students' Section.*)—Engineers' Club, Manchester. 7.15 p.m. Liverpool Exchange paper. (*Dundee Sub-Centre.*)—Thursday, February 9th. University College, Dundee. 7.30 p.m. "Some Less Common Applications of Electricity." Mr. D. H. Bishop. (*Sheffield Sub-Centre.*)—Friday, February 10th. Annual supper dance. (*North-Eastern Students' Section.*)—Saturday, February 11th. Visit to Dunston power station.

Diesel Engine Users' Association.—Tuesday, February 7th. Coventry Restaurant, W. 7, for 7.30 p.m. Annual dinner.

Illuminating Engineering Society.—Tuesday, February 7th. Trocadero Restaurant, W. 7, for 7.30 p.m. Annual dinner.

Paisley Association of Electrical Engineers.—Tuesday, February 7th. Y.M.C.A., Paisley. 7.30 p.m. "Neon Lighting and Electric Signs."

Television Society.—Wednesday, February 8th. University College, Gower Street, W.C. 7 p.m. "The New Gas Discharge Tubes and their Application to Television." Mr. N. L. Harris.

Electrical Association for Women.—Wednesday, February 8th. Electrical Housecraft School, S.W. 3 p.m. "Dinner for Four for the Cook-Hostess." Miss Anna Holm.

Institution of Heating and Ventilating Engineers.—Wednesday, February 8th. Hotel Russell, W.C. 2.30 p.m. "The Warming and Ventilation of the Masonic Peace Memorial Building, London." Mr. E. Herring. (Introduction by Mr. J. Roger Preston). 7 p.m. Dinner.

Association of Mining Electrical Engineers.—Saturday, February 11th. South Wales Institute of Engineers, Cardiff. Mining film.

Notes

The Handling and Storing of Grain

The supply of electricity to terminal elevators in Canada is usually purchased from an outside source. Mr. H. H. Broughton, in an address to the Institution of Mechanical Engineers, stated that the price of electricity was generally less than 1d. per kWh and under favourable conditions ¼d. In a modern large clearing house shipping grain by direct spouting the consumption should not exceed 0.85 kWh per ton handled. The high-voltage supply was transformed to 550 V for power and 110/220 V for lighting and signals. Usually the continuous rating of the transformer was from 50 to 60 per cent. of the combined ratings of the motors installed. The electrical installations comply with the National Electrical Code for " hazardous locations " owing to the explosive nature of the dust; also, conveyor belts and other details liable to become charged with static electricity are earthed. The most recent practice is to use a number of self-starting synchronous motors for driving such machinery as the receiving and shipping legs to the extent of half of the total horse-power, as the power factor would otherwise be very low when grain was not flowing. Conveyor belts, cleaning machines, fans, and other small plant are almost always driven by squirrel-cage motors. A motor required to start against a heavy load is fitted with two s.c. windings. Depending upon their situation the motors may be totally enclosed, enclosed ventilated, or pipe-ventilated, but the last is not recommended in view of the difficulty of making air-tight joints in the trunking and of ensuring a supply of clean air from the outside. The machines are usually fan-cooled.

A Survey of London Street Noises

The sound meters (one of which is illustrated herewith) with which the Western Electric Company is carrying out an unofficial survey of the volume of noise in London streets are generally similar to the instruments used in the survey of New York City, but they incorporate a number of improvements and are of British manufacture. The microphone is held in the position where it is desired to make a test and the amount of noise is registered in decibels. Headphones are connected to the sound meter.

The survey of London will probably take a year to complete, and so far it has been discovered that Ludgate Circus and Fleet Street with 83 decibels are the noisiest places, Lombard Street and the Embankment being quieter with 63 decibels. It

The Western Electric sound meter

is hoped that ultimately the authorities will decide on an official survey, when the data being collected at present will prove of value. The company is prepared to advance recommendations for the decrease of noise where necessary by treating the street surface with special new materials, by widening roads in extreme cases and altering the structure of buildings, and suppressing the use of certain types of motor horns.

In view of the complex noise situation in New York City a Noise Abatement Commission was appointed by the Commissioner of Health in 1929, and a report has already been issued.

The Electrical Research Association

The annual meeting of the British Electrical and Allied Industries Research Association will be held on February 15th at the Savoy Hotel, W.C. The luncheon will be held at 12.45 for 1 p.m.

Engineering Students

The dance given jointly by the graduates and students of the Institutions of Electrical and Mechanical Engineers and London students of Civil Engineering seems to have become an annual fixture. We hope so, as it emphasises the essential unity of engineering, another aspect of which was represented by the joint meeting with the " Mechanicals " held a few days before to hear a paper on steam-raising plant. The dance on January 27th was as enjoyable as that of last year, and the many evidences that this was so will recompense the organisers, Messrs. T. S. Smith, B. W. Pendred, and A. S. West representing the electrical, mechanical, and civil interests, for the work they had done to ensure the success of the function. In spite of many last-moment cancellations of applications for tickets due to the prevailing epidemic, the number present was over 370, which necessitated the use of two of the Victoria Halls. In one of these the control of colour and intensity of the lighting excited very favourable comment.

Educational

A course of six lectures on " The Accumulator " will be given by Mr. R. Wheatley Minter at the Chelsea Polytechnic, S.W.3, on Wednesday evenings at 7.30 p.m., commencing on February 15th.

Appointment Vacant

Mains superintendent for Ealing Electricity Department. (See our classified advertisements.)

Engineers and Architects

In a paper read before the Architectural Association, Mr. Howard Robertson (director of the A.A. School) said that he foresaw that the architect would become increasingly aware of engineering possibilities, and that the engineer would have a better understanding of building construction. Engineering and mechanical equipment must come more closely into the curriculum of the architectural student. Acoustics, illumination and economical design of plant would be more fully covered. The architect must design from a basis of purpose: the absence of purpose had been responsible for the failure of the architect to meet the needs of to-day in the construction of power stations, factories, and other buildings that represented new problems.

The E.P.E.A. (London Technical Group)

The London Technical Group of the Electrical Power Engineers' Association will hold its annual dinner and dance on February 25th at the Napoleon Restaurant, Regent Street, W., at 7 p.m.

The Institute of Chemical Engineers

The annual meeting of the Institute of Chemical Engineers will be held at the Hotel Victoria, Northumberland Avenue, W.C., on February 17th, commencing at 11 a.m. It will be followed in the evening by the annual dinner (7 for 7.30 p.m.):

An Inspection by the Board

In the course of a tour of selected stations under the Mid-East England area of the grid scheme, the operation of which came under the control of the Central Electricity Board as from January 1st, the Bradford and Halifax undertakings were visited recently by Sir Andrew Duncan (chairman of the Board), Sir Archibald Page (general manager), Mr. Harold Hobson (commercial manager), and Mr. S. E. Fedden (manager of the area). In each town the visitors were welcomed by the civic chiefs, chairmen and deputy chairmen of the local electricity committees, the electrical engineers and other officials. The undertakings were inspected by the visitors and private conferences took place in both places as to the relationships of the local undertaking with the Board and the means by which it is expected to secure mutual benefit. Sir Andrew stressed the fact that the Board wished to be regarded as a partner in a mutually beneficial scheme and not as a busybody interfering with the industry or with anybody's undertaking. It was true that the smaller stations of the country were likely to be the first to show beneficial results of this co-operative working, but in the course of time the scheme would undoubtedly work to the advantage of all.

Bathroom Fatalities

Three people have been killed in their baths recently by electric shock. In the first case a 17-year-old Liverpool girl was found in her bath with an overturned electric radiator on top of her, and she died after admission to hospital. Another girl, 23 years of age, was killed at Elland, Yorkshire, through using a badly insulated hairdrier while in her bath. A verdict of " Accidental Death " was returned. The third fatality occurred at Fenham, Newcastle, where a man was killed by falling over an electric radiator when he had gone to have a bath. He was recovering from influenza and it is believed that he must have fainted. The subject is commented upon in our leader columns.

New Ipswich Showrooms

The new showrooms for the Ipswich Corporation Electricity Department were formally inaugurated by the Mayor and Mayoress of Ipswich on February 2nd.

Our Service Department

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of the makers of the following:—

" NITRAPHOT " lamp.

" MAGNETO " lever-operated electric hand lamps.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. R. H. Parton

Mr. R. H. Parton has joined the London and Home Counties Joint Electricity Authority's consumers' engineer's department, at the Surbiton office. Mr. Parton commenced his electrical career in 1908 with the Sheffield Electricity Department as meter test room assistant. In 1919 he joined the sales staff of the British Westinghouse Co., and was subsequently transferred to Metro-Vick Supplies as assistant salesman. During the British Empire Exhibition in 1924 he was on the staff of the British Electrical Development Association at Wembley. He returned to Sheffield as assistant consumers' engineer, and in 1927 went to Shanghai to take up the position of installation inspector with the Shanghai Power Co. He returned to this country for health reasons last year, and commenced his new duties on Wednesday last.

Mr. Cyril P. Paige, Castleford district manager for the Yorkshire (West Riding) Electric Tramways Co., Ltd., has been selected from forty-two applicants as the new general manager of Bury (Lancashire) Corporation transport undertaking. The salary is £650, rising to £750.

We regret to learn that **Mr. H. W. Roberts,** sales director of the General Electric Co., Ltd., is lying seriously ill in a nursing home, suffering from pneumonia.

Mr. R. A. Fearnley, general manager and engineer of the Southend-on-Sea Corporation Transport Department, has been appointed transport engineer at Coventry in succession to **Mr. T. R. Whitehead,** who is retiring upon superannuation.

Mr. Allen West has been appointed by the British Electrical and Allied Manufacturers' Association, Inc., as its representative upon the Trade Mission which is leaving for Finland on February 8th to discuss with the Finnish Government the possibilities of increasing trade between the United Kingdom and Finland.

Mr. J. T. H. Legge, managing director of the Shropshire, Worcestershire and Staffordshire Power Co., who recently took over the management of the South Wales Power Co., has been appointed to the board of Edmundson's Electricity Corporation, Ltd. He will retain his positions with the Shropshire and South Wales companies.

Mr. Waldo Maitland, A.R.I.B.A., architectural adviser to the E.L.M.A. Lighting Service Bureau, has set up under the style of Waldo Maitland & Partners, at 23, Bloomsbury Street, W.C.1, to undertake consulting and other work in connection with modern electric lighting schemes for private and public buildings of all types. Mr. Maitland will continue to advise the Lighting Service Bureau on all architectural matters.

Mr. Eric Maddison, of Maddison and Marriage, electrical engineers, Bury St. Edmund's, was married recently to Miss N. Hawkins, of Bury.

Mr. V. G. Motwane, of the Eastern Electric & Engineering Co., Bombay, agents for all classes of electrical goods, is now in England. He will remain in this country for another three or four weeks. His address is c/o Levetus, Ltd., 194, Bishopsgate, E.C.2.

Mrs. P. B. Ingilby, of Ingilby Motors, has resigned from the secretaryship of the Leeds branch of the Electrical Association for Women, and her successor is **Mrs. L. R. Morshead.** Mrs. Ingilby has played an important part in the building up of the Leeds branch, and it is because it has grown to such a considerable size that she feels she cannot do full justice to the position while carrying on her own electrical business. At an informal luncheon at which she was the guest of honour, Mrs. Ingilby was presented by the members with a gold wristlet watch, which was handed to her by Mrs. John Marshall, the hon. treasurer.

Mr. Temple Davies, superintendent of the Prince Rock power station, Plymouth, has been appointed by the Corporation as chief assistant in the Electricity Department. There were 143 applicants for the post. Before going to Plymouth, Mr. Davies was assistant electrical engineer to Messrs. Cory Bros. & Co., Ltd., colliery proprietors, Cardiff. He was appointed station superintendent at Prince Rock in September, 1931.

Obituary

Mr. A. Doxey.—The death occurred on January 29th, at his home in Sheffield, of Mr. Alfred Doxey, aged sixty-seven years. One of the local pioneers of electricity, he served the Electric Supply Department and its predecessors for forty-six years. He retired in December, 1930. He went to Sheffield in 1884 as an assistant in the telephone service inaugurated by Mr. Tasker, and he was associated with the first demonstration of electric lighting at the Drill Hall in 1887. The undertaking with which he was connected was purchased in 1898 by the Sheffield Corporation.

Mr. A. H. Wiggin.—The death is reported of Mr. Alfred Harold Wiggin, which occurred suddenly on January 29th at his home, Bordesley Hall, Alvechurch, near Birmingham. He was a director of a number of companies, and was formerly managing director of Henry Wiggin & Co., metal manufacturers, of Birmingham.

Mr. D. B. Donald.—The death is announced after an operation, at the age of 34 years, of Mr. Daniel Barker Donald, who had for some years been general manager in Paris of the India Rubber, Gutta Percha & Telegraph Works Co., Ltd.

Mr. W. Grant.—The death occurred at Blackpool on January 22nd of Mr. William Grant, who was for twenty-seven years manager of the Corporation tramways at Ayr, from which position he retired last year.

At the opening of the new E.A.W. headquarters (see page 153). Left to right: Mrs. Ll. B. Atkinson, the Dowager Lady Swaythling, Lady Moir, the Lady Mount Temple and Councillor Mrs. Gregory.

Mr. G. J. Shave.—The death is announced of Mr. G. J. Shave, chief engineer of the London General Omnibus Co., Ltd., which occurred on January 30th at the age of 64. Mr. Shave received his engineering training with Messrs. Clayton and his electrical training with Messrs. Paterson & Cooper. Before joining the L.G.O.C. he was connected with the Locomobile Co. of America in London, and the S.M. Car Syndicate of Willesden. He was appointed manager of the Walthamstow works of the L.G.O.C. in 1912, and subsequently held successively the posts of assistant engineer, assistant chief engineer, and operating manager and chief engineer. As chief engineer he was responsible for the installation of the central overhaul works at Chiswick in 1922, which involved a great deal of electrical work. The interment took place yesterday at Chiswick Cemetery.

[*Bertram Park*

The late Mr. G. J. Shave

Will.—Mr. John May, of Messrs. May & Hawes, and a director of the Reading Electric Supply Co., left £152,594 (net personalty £139,640).

Indian Electrical Notes.

By OUR INDIAN CORRESPONDENT

THE Indo-Japanese wireless service was inaugurated in Bombay at the Central Telegraph Office by Sir Frank Noyce on January 11th, before a large audience. This service has been the result of the negotiations successfully carried on by Mr. Uchida, the president of the Japanese Wireless Telegraph Co., with the Indian Radio Co., the latter having obtained a licence from the Government of India. The necessary wireless stations have been erected in Kirkee, near Poona and Dhond. It is unfortunate that Mr. Uchida died suddenly on January 4th. Messages were exchanged between the Viceroy and Sir Frank Noyce and between the Minister of Communications, Tokyo, and Sir Frank.

Electrical Administration in Bombay

The Bombay Reorganisation Committee has recommended that the Bombay Electrical Department as such should be abolished. At present the department is in charge of a Government electrical engineer of the status of superintending engineer. The department has two branches, one of which is under an executive engineer of the electrical division responsible for the maintenance of the electrical installations, and the other under the electrical inspector, who conducts the inspections required by the Indian Electricity Act. Under the Committee's recommendations, the first branch would be transferred to the Public Works Department with, if necessary, an assistant electrical engineer. As regards the inspection branch, the Committee thinks that as the number of non-statutory inspections is very large the staff may be very considerably reduced.

Punjab Hydro-Electric Scheme Tests

The main line of the Mandi hydro-electric scheme between Lahore and Jogindranagar was tested at the full pressure of 132,000 V recently; the insulation and switchgear stood the test well and there was no interference with the communication lines or the telegraph or telephone circuits. This main transmission line connects the sub-stations at Kangra, Pathankot, Verka and Shalimar in Lahore, whence lines branch off to Jullunder where transformers are installed, and the line is continued to Ludhiana at 35,000 V. The next line to be energised will be the 66,000-V circuit between Lahore and Ferozepore through Kasur, and this will be done as soon as the synchronous condensers installed in Shalimar sub-station have been dried out and put into position. It is understood that the commercial supply of energy will begin in April next.

Electric Power in Bombay Mills

Presiding at a recent meeting of the Bombay Institution of Engineers, Mr. F. E. Bharucha observed that though hydro-electric power was used in many mills in Bombay, some of the mills still preferred steam power as they thought that it was cheaper. There was ample hydro-electric power available in Bombay, and he could not understand why steam could be found cheaper. It was a point deserving the fullest investigation.

Cochin and Ahmedabad

The Cochin Durbar has applied to the Government of Madras for a supply of electricity from the Pykara project to meet the requirements of the towns of Trichur and Ernaculam. The Durbar has guaranteed a minimum income of Rs. 3 lakhs per annum. It is understood that this scheme may involve the Government of Madras in an investment of Rs. 24 lakhs.

The Ahmedabad Municipality has decided to erect its own power station to supply electricity to the town, after the expiry of the present contract with the Electric Supply Company in 1935. It is estimated that the annual savings will repay the cost in ten years. The electrical engineer to the Municipality has been asked to prepare a scheme for the project.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Guardian Signals, Ltd.—Private company. Registered in Edinburgh on January 23rd. Capital £7,500 in £1 shares. Objects: To carry on the business of manufacturers and wholesale and retail merchants of and agents for electrical signals and appliances, alarm devices, or other apparatus for giving or receiving signals, &c. Registered office: 79, West Regent Street, Glasgow.

Lambert Laws (Wholesale), Ltd.—Private company. Registered January 26th. Capital £500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in quartz lamps, reflectors, bells, fires, stoves, cookers, switchboards, control gear, dynamos, motors, &c. The directors are: E. Lambert, 48, St. John's Road, Tunbridge Wells; P. Grayson-Tomkins, 45, Stafford Road, Brighton.

Gibson Todd & Co., Ltd.—Private company. Registered January 20th. Capital £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in insulating materials, electrical and otherwise, electricians, electrical and mechanical engineers, &c. The life directors are: Thomas E. Gibson, 26, Buckingham Road, Chorlton-cum-Hardy; David Todd, 14, Bakewell Road, Stretford; Charles Locan, 48, Westbourne Road, Birkdale; and Harry R. Hayes, 30, St. Ann Street, Manchester.

Warwickshire Electric Refrigerator Co., Ltd.—Private company. Registered January 26th. Capital £2,000 in £1 shares (1,500 ordinary and 500 deferred). Objects: To carry on the business of manufacturers of and dealers in refrigerators and cold storage machinery, plant, and apparatus, &c. The subscribers are: R. V. Summers, Rushmere Avenue, Northampton; and H. W. Johnson, 11, Rectory Road, Sutton Coldfield, Warwickshire. Solicitor: P. R. E. Smith, 23, Hatton Avenue, Wellingborough.

Domestic Equipments, Ltd.—Private company. Registered January 20th. Capital £10,000 in £1 shares. Objects: To acquire the business of a manufacturer of vacuum cleaners and other domestic equipment carried on by A. W. Griffiths at 211, Deansgate, Manchester, as the "All British Suction Cleaner Co.," and to carry on the business of manufacturers of and dealers in electric irons, brushes, washing utensils, electric drying machines, &c. The directors are: A. W. Griffiths, 50, Panton Road, Hale, Ches; G. A. Beard, 33, Barnfield Crescent, Sale; A. J. Beard, 35, Barnfield Crescent, Sale. Registered office: 57, Princess Street, Manchester.

Newmode Electric Appliances, Ltd.—Private company. Registered January 30th. Capital, £5,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electrical and mechanical machinery, plant, apparatus and appliances, lamps, fittings, wireless apparatus, &c. The first directors are to be appointed by the subscribers. Solicitor: A. R. Monks, Crown House, Aldwych, W.C.

Southons, Ltd.—Private company. Registered January 30th. Capital, £500 in £1 shares. Objects: To acquire the business of a wireless and electrical engineer carried on by H. Southon at 164, Seaside, Eastbourne. The first directors are: William W. Southon, 2, Seaville Drive, Eastbourne, and Herbert Southon, 15, Belmore Road, Eastbourne. Secretary: W. W. Southon. Registered office: 164, Seaside, Eastbourne.

Kadette, Ltd.—Private company. Registered January 28th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless and electrical apparatus, &c. The directors are: Eric C. Norfolk, 44, Ennerdale Road, Richmond, and George Mayle, 44, Ennerdale Road, Richmond. Registered office: 21, Northumberland Avenue, W.C.2.

Returns of Electrical Companies

Santon, Ltd.—Satisfaction in full on January 3rd, 1933, of charge dated January 14th, 1927, and registered January 25th, 1927. (According to the register of mortgages, the charge, registered January 25th, 1927, originally secured all moneys due to bank not exceeding £1,800.)

Van Raden and Co., Ltd.—Satisfaction in full on August 23rd, 1932, of debenture dated September 5th, 1924, and registered September 9th, 1924, securing £1,200. (Notice filed January 20th, 1933.)

Imperial and International Communications, Ltd.—Satisfaction, to the extent of £500,000, on December 31st, 1932, of debentures, authorised July 28th, 1930, and registered December 23rd, 1930.

Midways Electric, Ltd.—Violet H. Downie, 55, Gatliffe Mansions, S.W.1, ceased to act as receiver and manager on January 19th, 1933.

London Power Co., Ltd.—Particulars have been filed of four per cent. debenture stock, to secure £3,000,000, and any further stock issued under the trust deed, authorised January 13th, 1933. The amount of the present issue is £1,000,000. Property charged: the company's undertaking, property, assets and revenue, present and future, ranking *pari passu* with the charges created by the company for securing issues amounting in the aggregate to £17,000,000 5 per cent. debenture stock. Trustees: Law Debenture Corporation, Ltd. (The stock is issued at £101 10s. per cent., the company paying a brokerage of 5s. per cent.)

Burford Electric Light & Power Co., Ltd.—Satisfaction in full on December 30th, 1932, of (1) debentures for £1,500 authorised June 10th, 1911, and registered July 11th, 1911; and (2) mortgage for £270 dated September 26th, 1923, and (3) second debenture for £1,000 dated September 27th, 1923, both registered October 3rd, 1923.

Flinders (Wholesale), Ltd.—Issue on January 5th, 1933, of £930 debenture stock, part of a series already registered.

Foster & Pullen, Ltd.—Capital, £5,000 in £1 shares. Return dated August 23rd (filed October 8th), 1932. 4,680 shares taken up. £2,680 paid. £2,000 considered as paid. Mortgages and charges, £1,698 19s. 10d.

H.P. Electrical Co., Ltd.—Capital, £1,000 in £1 shares. Return dated October 3rd, 1932. 654 shares taken up. £654 paid. Mortgages and charges, nil.

Stearn Electric Co., Ltd.—Capital, £4,000 in £1 shares. Return dated November 29th, 1932. All shares taken up. £2 paid. £3,998 considered as paid. Mortgages and charges, £9,700.

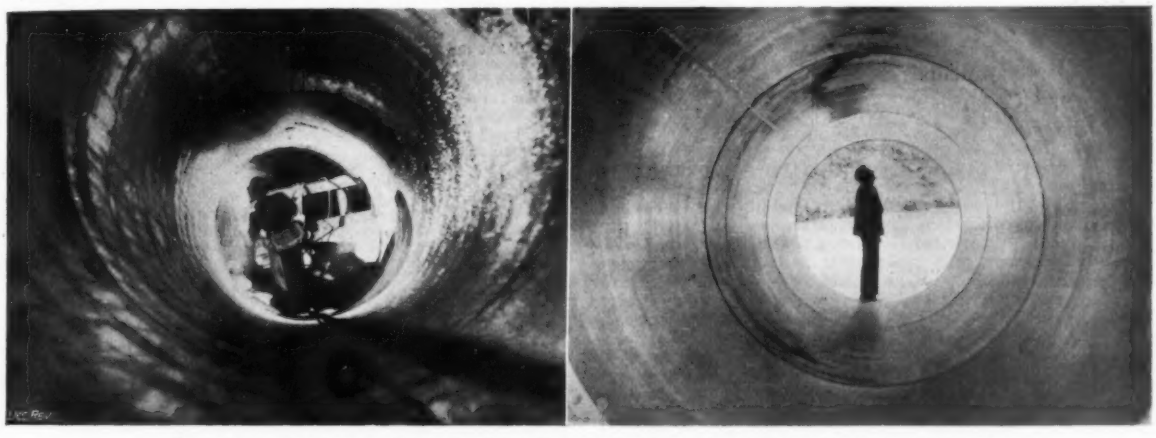
Corwen Electric Light Co., Ltd.—Capital, £2,000 in £1 shares. Return dated November 8th, 1932. 1,610 shares taken up. £1,610 paid. Mortgages and charges, nil.

General Accessories Co., Ltd.—Particulars filed of debenture stock not exceeding £16,000, authorised January 4th, 1933, and covered by trust deed of same date, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £16,000. Trustees: T. Swan and T. H. Barnes.

Oxford Radio Supplies, Ltd.—Capital £1,500 in £1 shares. Return dated August 10th, 1932. 1,400 shares taken up. £1,400 paid. Mortgages and charges, nil.

W. Mackie & Co., Ltd.—Capital £12,000 in £1 shares. Return dated October 6th, 1932. 7,500 shares taken up. £3,155 paid. £4,345 considered as paid. Mortgages and charges, nil.

Hailwood & Ackroyd, Ltd.—Capital £25,000 in 3,200 preference and 1,800 deferred shares of £5 each. Return dated December 5th, 1932. All shares taken up. £15,500 paid on 3,100 preference shares. £9,500 considered as paid on 100 preference and 1,800 deferred shares. Mortgages and charges, £50,000 debentures.



Two views of the arc-welded penstock at San Francisquito, California, described on page 165

Mawdsleys, Ltd.—Capital £20,000 in 13s. 4d. shares. Return dated October 17th, 1932. 28,025 shares taken up. £10,683 6s. 8d. paid on 16,025 shares. £8,000 considered as paid on 12,000 shares. Mortgages and charges, £9,695 11s. 11d.

Credenda Conduits Co., Ltd.—Capital £50,500 in £1 shares. Return dated November 8th, 1932. All shares taken up. £30,500 paid. £20,000 considered as paid. Mortgages and charges, nil.

City Notes

The Mid Southern Utility Co. is, according to the *Financial News*, to make an issue for the sale by tender of £150,000 four per cent. perpetual debenture stock.

The accounts for 1932 show a total revenue of £290,013, as compared with £276,382 in 1931. The report states that little change took place in the gas and water revenues, but the electricity revenue showed expansion; the figures are not strictly comparable with those of 1931 owing to the acquisitions by the company. After allowing for dividends on the consolidated preference stock and bank and debenture interest, it is proposed to pay the full statutory dividends for the second half of the year of £6 1s. per cent. per annum on the "A" stock, £4 11s. per cent. per annum on the "B" stock, and £5 per cent. per annum on the "C" stock, leaving £11,758 to be carried forward.

The Vera Cruz Electric Light, Power & Traction Co. reports an operating revenue for 1931 of 1,153,054 pesos, and a net revenue of 91,020 pesos. The company reports that it was unable to collect from the Vera Cruz Muncipality the accounts for power and lighting, and the total uncollected amount at December 31st, 1931, was 1,438,325 pesos. The tramway system was closed down on November, 1931, owing to the refusal of the Municipality to permit continued operation unless large expenditure was made on reconstruction. The company obtained a loan on open loan account from the Empresas Electricas Mexicanas to pay interest and meet sinking fund requirements, and this account had a balance of $395,457 (U.S.) at December 31st, 1931.

The Metropolitan Electric Cable & Construction Co., Ltd., reports a net profit of £20,418 for the year ended December 31st, which was only slightly lower than the profit for 1931 (£21,791). The addition of £881 brought forward gives an available balance of £21,299, of which £7,500 is placed to taxation reserve and £7,000 to general reserve. A final dividend of 5 per cent. free of tax is recommended, again making 10 per cent. free of tax for the year. A balance of £799 remains to be carried forward. The directors state that trading conditions were difficult during the year and the net earnings do not reflect the still further increased turnover. Mr. E. D. Basden has resigned from the board, and his place has been taken by Mr. M. J. D. Kerr.

The Traction & Investment Trust, Ltd., held its annual meeting on January 31st when Mr. H. A. Vernet (chairman), who presided, in the course of his speech said that the net revenue for 1932 was £62,339, as compared with £81,430 for 1931, a reduction of £19,091. Their estimate for 1933 still foreshadowed a diminution, due to defaults, moratoria, the controlled exchanges, and "blocked" foreign currencies. The large proportion of 43.90 per cent. of their investments were in Great Britain. There were not wanting signs of improvement in some industries, and there were indications also of a certain willingness to look ahead in the "heavy" industries which had suffered prolonged depression. Countries were in trade matters interpedendent, however; we could not expect to prosper while our customers overseas were not prosperous enough to be able to trade with us.

The Reason Manufacturing Co., Ltd., reports a profit for the year ended July 31st of £6,016. Since the date of the balance sheet an interim dividend of 100 per cent. has been declared on the ordinary shares (owned by Allen West & Co.). No further distribution is proposed, and a balance of £3,927 is carried forward.

The Metropolitan Railway Co. has announced a final dividend on the ordinary stock of $\frac{7}{8}$ per cent., making $1\frac{3}{8}$ per cent. for the year (against $2\frac{1}{2}$ per cent). The carry-forward is £36,966 (£41,482). On the Surplus Lands stock the final dividend is $2\frac{1}{2}$ per cent., making $3\frac{5}{8}$ per cent. for the year (against $4\frac{1}{4}$ per cent.).

The Midland Counties Electric Supply Co.—The *Financial News* reports that this company, which made an issue in December of £700,000 4 per cent. debenture stock, has placed a further £300,000 of the stock, bringing the total to £1,000,000, the amount authorised.

The Yorkshire Electric Power Co. has announced a final ordinary dividend of 5 per cent., making 8 per cent. for 1932 (same).

R. A. Lister & Co., Ltd.—At a meeting held on January 31st sanction was given to the issue at par of 250,000 6 per cent. cumulative preference shares of £1 each.

The Newcastle and District Electric Lighting Co., Ltd., is to hold an extraordinary meeting on February 24th when a resolution will be submitted for increasing the capital to £600,000 by the creation of 150,000 new £1 ordinary shares.

Stocks and Shares

TUESDAY EVENING.

THERE is little or no cessation in the demand for good-class stocks and shares. Prices of these steadily increase, and with the area of supply narrowed by the desire that no more corporation stocks shall be issued for the present, the existing securities are forced up by the persistent demand that prevails for them. This affects the prices of prior charge stocks in the Home Railway market, and as examples of the quotations at which prices now stand, the T.F.A. $4\frac{1}{2}$ per cent. debenture stocks of the London Electric Railway, City & South London, and Central London, may be quoted as standing at 107. North Metropolitan Power 5 per cent. guaranteed debenture, another of the stocks in the Trades Facilities Acts group, stands at 108, and North Wales Power $4\frac{1}{2}$ per cent. guaranteed debenture stock, also in this list, is 102. Moreover, the difficulty is that in most of these T.F.A. issues, the would-be buyer cannot obtain the offer of any appreciable amount of stocks at the current quotations.

The argument is frequently heard that gilt-edged securities now stand upon an artificial level, and that, when trade throughout the country takes a definite turn for the better, to-day's prices will have to come down. In the meantime, however, with no particular indication of a material change in the trade outlook, the accumulation of money forces up prices. The $4\frac{1}{2}$ per cent. debenture stocks of the electricity authorities remain at 106, giving a return on the money of $4\frac{1}{2}$ per cent. London Power new 4 per cent. debenture holds its price at 104.

Home Railway Stocks

Apart from a point decline in Metropolitan consolidated stock to 60 the Home Railway and Tube ordinary stocks are without alteration. On the steam lines, the traffic returns are still lamentably poor. Week succeeds week, month follows month,

and the Government does nothing to assist one of the most important branches of employment in the country. Trade is declared, by many authorities, to be mending, but, if it is, the railway companies are obtaining no benefit, and the electric railways are fortunate in depending so little upon freight carriage for their earnings.

Electricity Supply

Metropolitan Electric ordinary shares have risen to 48s. 9d., showing a gain of 1/16 on the week, and County of London are equally better at 51s. 3d. Electric Supply Corporation further strengthened to 3 1/16, following upon their rise of last week, but St. James' and Urban ordinary are both easier, the latter shares giving way to 33s. 9d. In the provincial group, North Eastern ordinary and preference are both harder. Clyde Valleys strengthened to 35s. Amongst foreign shares a persistent demand for Whitehall Electric 7½ per cent. preference has served to put up the price to 17s. 6d. At and around this figure a good many thousand shares have changed hands during the past few days, and it is said that the bulk of the buying emanated from trust companies. Certainly, the yield on the money is a good one, but the list of holdings in the Whitehall Electric Trust includes shares in various undertakings upon which the misfortunes of South America have lately pressed with harshness.

Whitehall 6 per cent. debenture has risen to 103½, in sympathy with the strength shown by the preference shares, and in both cases the amount of supply available is comparatively meagre. North Eastern 5 per cent. debenture stock at 110 shows a gain of a point.

Available Investments

There are 1,000 Electric Finance & Securities ordinary shares on offer at 57s. 6d. These pay £4 6s. 9d. per cent. on the money. A few hundred Chiswick Electric Supply ordinary can be bought at 42s. 9d., to give £5 2s. 9d. per cent., and 500 Newcastle & District Electric Lighting ordinary are available at 33s., to pay £4 4s. 9d. per cent., these returns being based, of course, upon the dividends last declared by the companies. Some little interest is taken in the probable dividend that may be declared by the British Power & Light Corporation. For 1932, the company paid 3 per cent., against nothing in each of the three preceding years. The company's financial year ends on March 31st, and it is hoped that there may be some improvement in the dividend due next May. On the basis of the 3 per cent. rate, the yield at the present price of 17s. comes to a little over 3½ per cent.

Five thousand Hendon Electric new ordinary shares are offered at 92s. 9d., free of stamp and fee, for settlement on February 23rd. Midland Counties has placed the balance, £300,000, of the million pounds 4 per cent. debenture stock which the company had power to issue, and dealings started in the new stock on the basis of 104, free of stamp and fee. The first interest payment is due on July 1st, when a fractional amount of 22s. per cent. will be due.

Cables & Wireless

Movements in the Cables & Wireless market are becoming less spectacular than those which took place earlier in the year. In our present lists, the preference stock is down a point, but the "B" ordinary stocks shows a small improvement. Dealers in the market say that the attraction of their stocks has been overshadowed by the lively speculation that has sprung up in South African gold mining shares, and is absorbing the interest, at any rate for the time being, that is generally shown in Cables & Wireless at a time when the half-yearly dividend payment is getting near at hand. Great Northern Telegraphs are firm, with a rise of £1 to 29½, the yield offered at that price being a temptation to the investor. The Anglo-American group keeps tolerably steady. American Telephone & Telegraph remain at 155½ and Internationals at 11. Globe Telegraph preference have recovered to 11¼.

Manufacturing Shares

Electric Constructions have been a feature of strength with a jump to 13s. 9d., and shares in this department are, generally speaking, firm to steady. Henleys at 6⅜ are 1/16 harder. Associated Electrical ordinary have receded to 18s. 9d. Ever Ready shares are threepence harder at 28s. 6d. There is not so much doing in the market as there has been of late, probably owing to the activity which has developed in mining shares. As has been pointed out here on several recent occasions, the yields offered by the principal manufacturing companies' shares are distinctly modest, and therefore, when superior attraction comes along in the shape of higher-yielding shares, a certain amount of realisation of the former is inevitable.

Iron, steel and engineering shares have remained quiescent. Babcock & Wilcox receded to 41s. 3d. Vickers hold their ground at 7s. The speculative excitement attracted to South African, and other mining shares, has robbed the miscellaneous market of public interest in a number of its industrial sections.

Dollar Issues

Brazilian Tractions have receded to 11. Rio de Janeiro Tramway Light & Power 5 per cent. gold bonds, upon which the interest is payable in dollars, stand at 117½, whereas the company's 5 per cent. sterling mortgage 50-year bonds are no better than 73½. Shawinigan Water common shares at 15 are ex the dividend of 13 cents. Power Corporation of Canada are a trifle easier at 8½.

Share List of Electrical Companies

	Nom.	Approx. Dividend.¶ 1930.	1931.	Price, Jan. 31.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	71/3	—	4 4 3
Brompton Ordinary	1	8½	8½	33/6	—	4 3 7
Central Electricity 4½% Deb.	Stock	4½	4½	106	—	4 5 0
Charing Cross Ordinary	1	8⅞	8⅞	33/6	—	4 3 7
Chelsea	1	8⅞	8⅞	33/-	—	4 4 10
City of London	1	10	10	34/6	—	4 1 2
Clyde Valley	1	8	7	35/-	+1/16	4 0 0
County of London	1	11	10½	5 /3	+6d.	4 1 8
Edmundsons' 7% Pref.	1	7	7	29/6	—	4 15 0
Elec. Dis. Yorkshire	1	9	9	42/6	—	4 4 8
Elec. Supply Corporation	1	11	11	61/3	+1/16	3 9 0
Kensington Ordinary	1	8	8	33/6	—	4 3 7
Lancs. Light and Power	1	6½	7	32/6	—	4 6 2
London & Home Counties 4½% Deb.	Stock	4½	4½	106	—	4 5 0
London Electric	1	9	9	33/6	—	4 3 0
Metropolitan	1	10	10	48/9	+1/16	4 2 0
Midland Counties	1	7	7	33/3	—	4 4 2
Mid. Elec. Power	1	8	8	35/-	—	4 11 5
North Eastern Electric Ordinary	1	6	6	29/-	+6d.	4 2 9
Do. 7% Pref.	1	7	7	32/-	+6d.	4 7 6
Northampton	1	10	10	50/-	—	4 0 0
Notting Hill 6% Pref.	10	6	6	12½	—	4 14 0
North Met. Elec. 6% Pref.	1	6	6	29/-	—	4 2 9
St. James' and Pall Mall	1	8	8	33/-	—6d.	4 4 10
Scottish Power	1	8	8	35/-	—	4 11 5
South London	1	8½	8½	33/-	—	4 4 10
Urban Ordinary	1	7	7	33/9	1/16	4 2 10
Westminster Ordinary	1	8½	8½	33/-	—	4 4 10
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	17/6	+1/16	8 11 2
Yorkshire Elec.	1	8	8	40/-	—	4 0 0
HOME RAILS.						
Central London Ord. Assented	Stock	4	4	82½	—	4 17 0
Metropolitan	"	3½	2½	60	—1	4 3 4
Do. District	"	5	4½	60½	—	7 8 9
Underground Electric	1	8	7	19/-	—	7 7 4
TELEGRAPH AND TELEPHONES.						
American Tel. & Tel.	$100	9	9	155½	—	5 15 9
Anglo-Am. Tel. Pref.	Stock	6	6	105½	—	5 13 9
Do. Def.	"	1½	1½	25	—	6 0 0
Cables & Wireless 5½% Pref.	"	5½	2½	81½	—1	3 7 6
Do. A 7½% Ord.	"	—	Nil	28½	+½	—
Do. B Ord.	"	—	Nil	11½	+½	—
Globe Tel. and T. Ord.	10	8½	Nil	11	—	—
Do. do. Pref.	10	6	6	11½	+½	5 6 8
Great Northern Tel.	10	20	20	29½	—	6 15 7
Marconi-Marine	1	15	10	35/-	—	5 14 3
Oriental Telephone Ord.	1	12	12	3	—	*4 0 0
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	—	—	1/9	—	—
Do. do. 2nd Pref.	5	—	—	1/9	—	—
Do. do. 5% Deb.	Stock	—	—	6	—½	—
British Electric Traction Def. Ord.	"	5	5	225	—	—
Do. do. Pref. Ord.	"	8	8	132½	—	6 0 9
Brazil Traction	100	—	—	11	—⅛	—
Brit. Columbia Elec. Rly. Pref.	Stock	5	5	102½	—	4 19 6
London & Sub. Trac. 5% Pref.	1	Nil	Nil	12/-	—	—
London United Tram Deb.	Stock	4	4	67½	—	6 2 2
Mexico Trams, 5% Bonds	—	5	5	47/½	—	10 10 6
Mexican Light Common	100	Nil	Nil	10	—	—
Do. 7% Pref.	100	7	7	15	—	—
Do. 1st Bonds	—	5	5	70	—	7 2 10
Victoria Falls Ord.	1	15	15	77/6	—	3 15 9
Yorkshire (West Riding)	1	Nil	Nil	5/6	+6d.	—
MANUFACTURING COMPANIES.						
Assoc. Elec. Ord.	1	6	4	18/9	—9d.	4 11 5
Do. Pref.	1	8	8	32/-	—	5 0 0
Babcock & Wilcox	1	14	14	41/3	—9d.	—
British Aluminium Ord.	1	10	5	23/9	—	4 4 0
British Insulated Ord.	1	15	15	68/9	—	4 7 3
Brush Ord.	Stock	5	Nil	37	—	—
Callender's	1	15	15	3½	—	4 16 0
Do. 6½% Pref.	1	6½	6½	28/3	—	4 12 0
Crompton Parkinson Ord.	5/-	30	24	22/6	—	5 0 0
Do. 8% Pref.	1	8	8	30/-	—	5 6 8
Edison-Swan 1st Pref.	1	7½	7½	24/6	—	6 2 5
Do. 5% Deb.	Stock	5	5	102½	—	4 17 7
Electric Construction	1	Nil	Nil	13/9	+½	—
Enfield Cable Ord.	1	25	25	4½	—	5 8 1
English Electric	1	Nil	Nil	12/6	—	—
Do. do. Pref.	1	Nil	Nil	16/6	—	—
Ever Ready	5/-	35	35	28/6	+3d.	6 3 6
Ferranti Pref.	1	7	7	23/9	—	5 18 0
G.E.C. Pref.	1	6½	6½	29/-	—	4 9 8
Do. Ord.	1	10	8	42/6	—	3 15 4
Henley's	1	30	30	6⅜	+1/16	4 14 1
Do. 4½ Pref.	5	4½	4½	5½	—	4 5 9
India-Rubber	1	Nil	Nil	2/6	—	—
Johnson & Phillips	1	10	5	1⅛	+	4 14 1
Siemens Ord.	1	7½	7½	27/-	—	5 11 1
Telegraph Construction	£1	Nil	Nil	16/3	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1931

10017. "Methods for the control of electronic streams." J. H. O. Harries. April 2nd, 1931. (385968.)

13513. "Measurement of alternating currents." C. R. G. Cosens and Cambridge Instrument Co., Ltd. May 7th, 1931. (385982.)

16485. "Dynamo-electric machines." British Thomson-Houston Co., Ltd., and A. H. Maggs. June 5th, 1931. (385986.)

17121. "Direct current motor control." Forges & Ateliers de Constructions Electriques de Jeumont. June 24th, 1930. (386009.)

17407. "Battery chargers and the like." W. H. Curtis. June 16th, 1931. (385972.)

18771. "Magnetic blow-out arrangements for electric switches." International General Electric Co., Inc. June 30th, 1930. (385990.)

19086. "Thermionic relay circuits." L. H. Harris. July 2nd, 1931. (Cognate application 22287/31.) (385974.)

19418. "Electrically operated valve means." Manlove, Alliott & Co., Ltd., and J. M. Hodges. July 6th, 1931. (385993.)

19639. "Electromagnetic switches, particularly for use in connection with the distant control of electric circuits." Johnson & Phillips, Ltd., and J. McGadie. July 8th, 1931. (385996.)

19647. "Radio receiving apparatus." A. V. Tomlinson (Union Switch and Signal Co.). July 8th, 1931. (385997.)

19648. "Radio receiving apparatus." A. V. Tomlinson (Union Switch & Signal Co.). July 8th, 1931. (385998.)

19762. "Metal-clad electric switchgear." A. Reyrolle & Co., Ltd., H. W. Clothier, J. Christie, and A. Allan. July 9th, 1931. (386000.)

19763. "Metal-clad electric switchgear." A. Reyrolle & Co., Ltd., H. W. Clothier, J. Christie, and A. Allan. July 9th, 1931. (386001.)

21703. "Electric transmission line switches." A. Rudman and Associated Electrical Industries, Ltd. July 29th, 1931. (386016.)

22593. "Electric signalling apparatus for transmitting either visible or audible signals." British Thomson-Houston Co., Ltd., and A. T. Stace. August 10th, 1931. (386020.)

24687. "Protective systems for electric circuits." British Thomson-Houston Co., Ltd. September 2nd, 1930. (386033.)

26482. "Welding processes." British Thomson-Houston Co., Ltd. September 22nd, 1930. (386043.)

27532. "Purification of acetylene prepared by thermal or electrical methods." J. Y. Johnson (I.G. Farbenindustrie Akt.-Ges.) October 3rd, 1931. (386052.)

28485. "Combined electric motor and gear units." D. Brown and Sons (Huddersfield), Ltd., and A. Sykes. October 14th, 1931. (386060.)

29229. "Gas-filled electron discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. January 26th, 1931. (386063.)

29256. "Electric switches of the quick-make-and-break type." British Thomson-Houston Co., Ltd. October 21st, 1930. (386064.)

30092. "Light signalling circuits, more particularly for railways." K. Meyer. October 30th, 1931. (386071.)

31,830. "Electrical resistances." Electro-mechanical Brake Co., Ltd., and G. N. Cadbury. November 17th, 1931. (386081.)

32170. "Electric fuses." J. A. Crabtree. November 20th, 1931. (386086.)

32588. "Contacts for circuit-breakers, switches, and the like." C. H. Flurscheim and Associated Electrical Industries, Ltd. November 24th, 1931. (386090.)

33261. "Jointing of hollow oil-filled electric cables." Suddeutsche Kabelwerke Zweigniederlassung der Vereinigte Deutsche Metalwerke Akt.-Ges. December 4th, 1930. (386093.)

33559. "High potential electric switches." Siemens-Schuckertwerke Akt.-Ges. March 11th, 1931. (386095.)

33904. "Thermal switches." Aktiebolaget Birka Regulator and A. O. Appelberg. December 7th, 1931. (386099.)

35918. "Gas-filled electron discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. April 20th, 1931. (Addition to 386063.) (386111.)

1932

114. "Adjusting devices for radio-receivers." B. Hesketh. January 2nd, 1932. (386114.)

280. "Selecting switches of the kind used in automatic telephone and like selective systems." Siemens Bros. & Co., Ltd., and E. A. Forceville. January 5th, 1932. (386118.)

4452. "Photo-electric cells." International General Electric Co., Inc. February 13th, 1931. (386143.)

6617. "Surface electrodes for use in diathermy treatments of the body." J. A. Huth. March 4th, 1931. (386153.)

9043. "Flexible fuse-plugs." E. Adams and S. W. Blakslee. March 29th, 1932. (386172.)

9456. "Method and apparatus for producing lighting effects for light signals, illuminated advertisements, and the like." Soc. Construzione Apparecchi Elettrodomestici Marelli. May 30th, 1931. (386175.)

10732. "Television receiving method and apparatus." American Television Laboratories, Inc. April 24th, 1931. (386,183.)

11142. "Combined flywheel magnetos and lighting dynamos." R. Bosch Akt.-Ges. April 20th, 1931. (386186.)

11621. "Indicating systems." British Thomson-Houston Co., Ltd. April 24th, 1931. (386189.)

12640. "Electric-motor-driven submersible pumps." L. Mellersh-Jackson (Siemens-Schuckertwerke Akt.-Ges.). May 2nd, 1932. (386196.)

12676. "Incandescent wire ignition plugs." R. Bosch Akt.-Ges. May 29th, 1931. (386197.)

15558. "Automatic telephones." F. Rumpf. June 2nd, 1931. (386215.)

16110. "Magnetic alloys." Westinghouse Electric & Manufacturing Co. July 17th, 1931. (386220.)

16430. "Electric lamp holders." A. Savary. November 26th, 1931. (386223.)

16925. "Electric switches with arc extinction by self-generated vapour." Siemens-Schuckertwerke Akt.-Ges. June 19th, 1931. (386225.)

17613. "Electric transforming device." C. Langbein. June 2nd, 1932. (386229.)

20527. "Joints for electric cables." British Thomson-Houston Co., Ltd. July 20th, 1931. (386252.)

21480. "Electric heating units." British Thomson-Houston Co., Ltd. July 30th, 1931. (386260.)

21580. "Variable electrical resistance units." London Electric Wire Co. and Smiths, Ltd., and S. B. Klein. July 30th, 1932. (386261.)

22183. "System of connections for limiting off the zones of action of single-phase controlling frequency currents in three-phase networks." Landis and Gyr Akt.-Ges. August 14th, 1931. (386267.)

22443. "Apparatus for transmitting electric impulses." A. Sidot and R. Taranne. March 16th, 1932. (386268.)

23369. "Electric fuses." J. A. Crabtree. November 20th, 1931. (Divided application on 386086.) (386273.)

24502. "Overload or short-circuit indicators for electric conductors." A. Reyrolle & Co., Ltd. September 15th, 1931. (386279.)

26592. "Electron discharge tubes." Allgemeine Electricitäts-Ges. September 25th, 1931. (386282.)

26701. "Liquid-break electric switches." British Thomson-Houston Co., Ltd. September 24th, 1931. (386283.)

27538. "Electromagnetic switches particularly for use in connection with the distant control of electric circuits." Johnson & Phillips, Ltd., and J. McGadie. July 8th, 1931. (Divided application on 385996. (386007.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from January 25th:—

Acculight (lettering and design). No. 535485. Class 1. Acids for use in electric batteries, &c.—Leon Kohen Gesellschaft, Charlottenburg, Berlin. (British representative: H. P. Goodman, 2, Victoria Road, Sheffield.)

Anderson's Drum Major Loud Speaker (lettering and design). No. 537228. Class 8. Radio-telephonic loud speakers.—Adam Anderson (trading as the Anderson Engineering Co.), 43, Hillmarton Road, Holloway, N.7.

Sonochorde. No. 536640. Class 8. Radio-receiving sets, loud speakers, gramophones used in combination with radio-receiving sets, television apparatus, and parts thereof, &c.—Sonochorde Reproducers, Ltd., 1, Willesden Lane, N.W.6.

Genalex. No. 537323. All goods in Class 10.—General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.

Enterprise. No. 534960. Class 13. Electric lamps (ordinary). —Thomas R. Maxfield, trading as T. E. Maxfield & Co., 11, Westfield Terrace, Sheffield.

Ensignette. No. 536280. Class 13. Electric lamps (ordinary). —Ensign Lamps, Ltd., Kent Street, Preston.

Electricity and the Working Woman

"HOW Electricity Can Help the Working Woman" was the subject of an address given by Mrs. Gregory, of the West Ham Corporation Electricity Committee, to the members of the East Devon branch of the Electrical Association for Women at the annual meeting held at Exeter on January 25th. Mrs. Gregory said that under a scheme of assisted wiring inaugurated in 1928 by the West Ham Council, nearly twenty-two thousand houses had been wired. The average price charged for the wiring was approximately one penny per point per week (including free replacement of lamps and maintenance).

The first move must come from the supply undertakings, which should offer assisted wiring, a hiring scheme with complete maintenance for the poorer classes of the community, and a hire-purchase scheme spread over five or seven years for other domestic consumers. Electric cooking based on the West Ham or Exeter tariffs (¾d. per kWh) should not be more expensive than gas at about three shillings and sixpence per thousand cubic feet. The greatest conservatism was found among educated middle-class women. It would be a strange inversion of the usual state of affairs if the working class woman so popularised the application of domestic electricity that it became fashionable.

Details regarding recent electrical development in Exeter were given by the city electrical engineer, Mr. A. L. Keet, who said that a low domestic tariff was introduced early in 1930, and from 875,000 kWh in the first complete year under the tariff they reached nearly two million kWh in the second year; last year over fourteen million kWh was sold and their present number of consumers was over 13,000. Assisted wiring and cooker hiring systems were in operation, and the mains had been extended to neighbouring rural districts. A complaint that cooking by electricity was slow had been met by the erection of several sub-stations. Under the all-in tariff it was possible to boil an electric kettle eight times for a total cost of one penny and cook a Sunday dinner for four people for about twopence farthing. They found that the inhabitants of rural areas were perfectly willing and glad to take a supply of electricity, provided that it was given cheaply and reasonably.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdare.—Houses (50); I. Bryant, U.D.C. surveyor.

Bath.—Premises, Avon Street, for the Bath and Tiverton Co-operative Society, Ltd., 46, Moorland Road; I. Long & Sons, Ltd., builders, 6, Stanley Road.

Bexhill-on-Sea.—Estate development, Hastings Road; J. E. Maynard, architect.

Bexley Heath.—Methodist Church, Barnehurst; trustees.

Birmingham.—Shops, Stratford Road, Sparkhill; Jones and Croxford, architects, 29, Waterloo Street.

Blackburn.—Indoor baths (£150,000); borough surveyor.

Blackpool.—School, Norbreck; borough engineer.

Bootle.—Schools, St. Joan of Arc's Parish (£25,000); Monsignor O'Brien, St. James' Schools.

Brighton.—Houses (280), Whitehawk Estate; borough engineer. Baths (£80,000), for the C.C. Cinema, St. George's Road and Paston Place; Cinema Services, Ltd. Development of Witting Estate; Mr. Witting. Insurance offices, 115, Queen's Road; Road Transport & General Insurance Co., Ltd.

Bristol.—Cinema, Station Road, Shirehampton (£20,000); Wm. H. Watkins, architect, 1, Clare Street. Municipal buildings; E. V. Harris, architect, 29, St. James's Square, London, S.W.1.

Burnley.—Houses, Casterton Avenue; borough surveyor.

Bursiem.—Houses (28), Bank Top Farm Estate; J. H. Broadhurst & Son.

Bury St. Edmund's.—Extensions to Baptist Church, Gower Street; secretary.

Cannock.—Houses (50), Pye Green Housing Estate (£14,900); F. & H. Judd, builders, Chester Road, Streetly.

Chelmsford.—Extensions to Congregational Church, North Avenue; deacons.

Cheshire.—Electric lamps, for eight institutions, for the County P.A.C.; W. H. Elwin, public assistance officer, Bridgegate House, Chester.

Chester.—Alterations to the Bars Hotel, Foregate Street (electric lighting installations); J. H. Davies & Son, 14, Newgate Street.

Chislet (KENT).—Houses (80), Hersden, for the Chislet Colliery Co.

Clitheroe.—Fire station, Holden Street; borough surveyor.

Clutton.—Houses (32); Thomas & Morgan & Partners, R.D.C. architects, Pontypridd.

Coventry.—Gas and electricity showrooms, Corporation Street (£22,000), and alterations and improvements to the public baths, Priory Street (£3,000); Thos. Bates & Son, Ltd., builders, 53, Warwick Street.

Croydon.—Houses (117), Ockley Road; H. Macintosh, East Croydon. Twenty-four garages, Tavistock Road; Vesta Finance, Ltd. Reconstruction of baths, Scarbrook Road (£5,534); S. E. Moss & Sons, Chelmsford.

Darvel (AYRSHIRE).—Lace factory, for Scade, Hamilton & Co., (£30,000).

Denby Dale (YORKS).—Houses (24), for T. Hollingworth and Son.

Derbyshire.—Extensions, Heanor Mining and Technical Institute, for the County E.C.; G. H. Widdows, county architect, St. Mary's Gate, Derby.

Ditchling (SUSSEX).—Re-erection of Coombe Down Lodge (mansion), for Major P. Garratt.

Dukinfield (CHESHIRE).—Public hall (£13,000); borough surveyor.

East Sussex.—School, Hailsham (£6,851), for the E.C.; county architect, Lewes.

Erith.—School, Belvedere (650 places), for the E.C.; D. S. Twigg, clerk.

Exeter.—Houses (28), Burnthouse Lane; Wilson, Lovatt and Sons, Ltd.

Gateshead-on-Tyne.—Synagogue; Dr. Chalkowski, hon. sec., Building Committee, Chief Synagogue. Extensions to High West Street Methodist Church (£5,000); B. Peele, Ltd., builders, East Mill Works, North Shields.

Goathland.—Extensions, Mallyan Spout Hotel, for Councillor C. N. Pulman; G. H. Fawcett, architect, Scarborough.

Gorleston (NORFOLK).—Development of Cliff Park Estate, Marine Parade; Ferrier & Ferrier.

Grays (ESSEX).—Houses (26); H. S. Goodall, U.D.C. surveyor.

Great Berkhamsted.—Houses (50); J. R. Hadfield, U.D.C. surveyor, 135, High Street.

Great Yarmouth.—Bus station, King Street; borough engineer, Town Hall. Extensions, electricity showrooms (£5,000); Olley & Haward, architects, Queen Street.

Hanley.—Alterations and additions to foundry, Ivy House Road; R. Goodwin & Sons.

Haywards Heath (SUSSEX).—Houses (20); U.D.C. surveyor.

Heanor (NOTTS).—Houses, Mill Lane and Aldreds Lane; U.D.C. surveyor.

Herne Bay.—Bathing pool; U.D.C. surveyor. Shops and flats, Mortimer Street, for Herne Bay Investments, Ltd.; R. Messenger, architect.

Hexham (NORTHUMBERLAND).—Premises for M. Jacksons (Clothiers), Ltd.; Glass, Harrison & Ash, architects, 20, Saville Row, Newcastle.

Hove.—Development of Barrowfield Estate; H. G. Turner.

Huddersfield.—Methodist Church and Institute (£8,250); trustees, Methodist Church, Thornton Lodge Housing Estate.

Keswick.—Omnibus station for the Cumberland Motor Services; J. Glaister & Son, builders, Church Street, Whitehaven.

Kingswinford.—Houses (22), Pensnett; R.D.C. surveyor, Wordsley, Stourbridge.

Kirriemuir.—Houses (20); burgh surveyor.

Lancashire.—School, Manor Road, Fleetwood; county architect, 16, Ribblesdale Place, Preston.

Lanchester.—Houses (70); E. Simpkin, R.D.C. surveyor, Council Offices.

Leadgate (DURHAM).—Houses (43), Front Street; T. Ripley, surveyor, Council Offices.

Leicester.—Extensions to works of A. E. Hawley & Co., Ltd., Sketchley Dye Works, Hinckley.

Leigh.—Extensions, Town Hall, with electrical installations (£2,146); G. Moss & Sons, Ltd., builders, St. Helen's Road.

Liverpool.—Extensions to dairy premises, Laburnam Road, for Walker's Dairies, Ltd., 5, Laurel Road.

London. — (BERMONDSEY). — Houses, Rotherhithe Street, Vauban Street, and Millpond (£56,000); B.C. works manager. (DEPTFORD).—Factory, Mantle Road; H. A. Scrase, 16, St. Helen's Place, E.C.3. (E.C.).—St. Etheldreda's Church, Ely Place (electric lighting installation); Sir Giles G. Scott, 7, Gray's Inn Square, W.C.1. (GREENWICH).—Blocks of buildings, Tunnel Avenue; W. Seymour & Co. (KENSINGTON).—Rehousing, Lancaster Road and Talbot Grove areas (£19,000); borough engineer. (TOTTENHAM).—Houses (29), White Hart Estate (£11,420); L.C.C. architect. (WOOLWICH).—Houses, Middle Park Estate (£33,000), and extensions to Highway depôt, Canada Wharf (£6,275); borough engineer.

Longton (STAFFS).—Extensions to swimming baths; Stoke city engineer.

Luton.—Works extensions, B. Laporte, Ltd., Kingsway, and Gelatine Works, Ltd., New Bedford Road.

Merioneth.—School, Bryncrug, near Towyn, with electric lighting installations (£3,334); Morris & Williams, builders, Harlech, North Wales.

Middlesbrough.—Houses (34) for the Cleveland Trust; S. Coates & Co., builders.

Newcastle-on-Tyne.—Houses (134), Westbourne Road and Fossway area; S. J. Stephenson, architect, 2, Saville Place. New Y.M.C.A. Club, Tenkle Street (£2,500); J. Jackson & Sons, builders, Corporation Street.

Newport (I.O.W.).—Central station, garages, workshops, and offices, Nine Acres, for the Southern Vectis Bus Co.; manager.

Northamptonshire.—School, Daventry, for the County E.C.; director of education, Northampton.

Northfleet.—Two shops, Perry Street; L. F. L. Bridgland.

Oxford.—Houses (138), Cutteslowe Estate; city engineer. Houses (48), Glebe Estate (£18,544); J. Aston & Son, Binley Road, Coventry. Stores, New Street, St. Ebbe's; Oxford Co-operative Society, Ltd. Alterations to Dragon School, Bardwell Road; Rev. A. E. Lyman.

Penrith.—Houses (28), Skirsgill Estate; P. A. Baines & Sons, Ltd.

Petersfield (HANTS).—Houses (34); R.D.C. surveyor.

Portsmouth.—Operating theatre at the Infectious Diseases Hospital, Milton; J. Lay & Co., builders, 207, Arundel Street.

Preston.—Public baths, Saul Street; borough surveyor.

St. Albans.—Houses (54), Sandridge Road Estate, for the Workmen's Housing Association.

Sanderstead (SURREY).—Congregational church; Rev. P. Figgis.

Scunthorpe.—Houses (50), Crosby Estate; W. Farrar, U.D.C. surveyor.

Shepton Mallet.—Houses (48); U.D.C. surveyor.

Shrewsbury. — Extensions, Monkmoor Schools, for the Borough E.C.; borough surveyor.

Southampton.—New showrooms, Pound Tree Road, for F. A. Hendy & Co., Ltd., 68, Above Bar.

South Shields.—Alterations to the Royal Hotel; T. A. Page & Sons, architects, 67, King Street.

Spalding.—Methodist Church; trustees, Methodist Church, Gosberton Clough.

Stanley (DURHAM).—Houses (150); A. Routledge, surveyor, Council Offices.

Stoke-on-Trent.—Houses, Longton; city surveyor. Houses, Carmountside (56) and Meir (52); city engineer. Houses (21), New Inn Lane, Trentham; A. Perry. Mill, works, &c., Acres Wood, near Bradeley; Wilkinson Bros. Additions to Windsor Pottery, Clayton Street; Co-operative China Manufacturers.

Stroud (GLOS).—Development, Farmhill Park, for residences; H. Wheatley & Sons, Cemetery Road.

Thornton Heath.—Alterations and additions to dairy depôt, Bensham Lane; E. Bates, 27, Queen Victoria Street, E.C.3.

Truro.—Houses (20), Higher Town; Menadue & Thomas, contractors, Perranporth.

Tynemouth.—Flats, Pineapple Estate; F. R. N. Haswell & Son. Development of Tynemouth Park Estate; J. R. Wallace, architect.

Wakefield.—Houses (40), Major Street; G. A. Nicholson, builders, 2a, Barnsley Road.

Wealdstone.—Shops and flats, Kenton Road; Berkeley Land Co., Ltd.

West Riding.—Schools, Hoyland and Thurnscoe (£15,650), for the E.C.; director of education, Wakefield.

Whickham-on-Tyne.—Development of land for the Priestman Collieries, Ltd.; Watson & Scott, architects, 16, Pilgrim Street, Newcastle-on-Tyne.

Whitby.—Houses (22), Upgang Lane, for B. S. Meek; H. Davies, architect.

Willington.—Houses (24), Rosedale Estate; D. McIntyre, U.D.C. architect, Durham.

Winchester.—Cinema, North Walls; L. F. Richardson, builders, London.

Wolverton.—Houses (60); U.D.C. surveyor.

Workington (CUMBERLAND). — Conversion of buildings, Central Square, into swimming baths (£3,000); borough surveyor, Town Hall, Oxford Street.

Worthing.—Cinema, Liverpool Road; Whinney, Son & Austen Hall, architects, 37, Norfolk Street, London, W.C.2. Houses (36) and garages, Shandon Road; E. J. Woodward, builder, Meadow Road. Hippodrome, Rowlands Road; H. Weston, architect, 6, Finsbury Square, London, E.C.

Wrexham.—Houses (62); D. E. Edwards, R.D.C. engineer, Imperial Buildings. Nurses' home, Plas-yn-Llwyn Hospital; Ridge & Fox, architects, Bank Chambers, Oswestry.